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AN XXXX SEX CHROMOSOME
COMPLEX IN TWO MENTALLY
DEFECTIVE FEMALES*

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AMONG THE abnormalities of human chromosomes that are being discovered in rapid succession, some involve the sex chromatin complex in patients with a female, or predominantly female, phenotype. These chromosomal anomalies fall into two categories, the first being abnormal only in the sense that the sex chromosome complex is contrary to the predominating features of the phenotype. Under this heading, in which the sex chromosome complex is XY, are included the syndromes of testicular feminization¹⁻³ and "pure" gonadal dysgenesis.^{4, 5} In the first of these syndromes, there appears to be a defect in the action of the masculinizing evocator substance that is elaborated under normal conditions by the fetal testes. In the second syndrome, the failure is primarily morphological rather than biochemical, for there is minimal and non-functional gonadal development.

The etiological factor in most cases of testicular feminization and "pure" gonadal dysgenesis probably lies at the gene, rather than the chromosome, level and there may be a connection between the genetic backgrounds of the two syndromes. This possibility receives some support from the recent study, by our group, of two sex chromatin-negative sisters, one with "pure" gonadal dysgenesis and the other with male pseudohermaphroditism and a predominantly female phenotype.

The second category of sex chromosome anomaly in females consists of instances in which the X chromosome material is either deficient or present

in excess, the Y chromosome being absent. A deficiency of X chromosomes is best documented in connection with chromatin-negative gonadal dysgenesis (including Turner's syndrome), where the sex chromosome "complex" consists of a single X chromosome (XO) or, in some cases, an XO/XX mosaicism.⁶⁻¹⁶ But gradations of X chromosome deficiency will perhaps be found, for there is on record a patient with gonadal dysgenesis who has a normal X chromosome associated with an X chromosome that is incomplete.¹⁷ Sex chromatin is usually lacking in XO individuals, although there can be concurrence of chromatin-positive nuclei and an XO sex chromosome constitution.¹⁸⁻¹⁹

Excessive X chromosome material occurs in the triplo-X female who is likely to be normal (and fertile), aside from mental retardation.^{11, 17, 20-22} There is a report of some cells having too few, and others too many, X chromosomes (XO/XXX mosaicism) in a patient with defective development of the reproductive system.¹⁷ The latter finding was confirmed in an additional patient, in unpublished work in our laboratory.

Mental retardation appears to be more common among persons with sex chromosome anomalies than it is in the general population. The purpose of this paper is to describe two patients, found during a buccal smear survey of institutionalized defectives, who have what we interpret as a hitherto unreported sex chromosome complex, namely, XXXX. The clue to the possibility of a particularly unusual complex was in the sex chromatin pattern of nuclei in the buccal smears. In earlier work, we had encountered duplication of the sex chromatin in 20 to 40% of nuclei in patients with three X chromosomes (XXX or XXXY),^{11, 23} but we had not previously found buccal smears in which a proportion of nuclei had *triplicated* sex chromatin.

CASE 1.—History; physical and laboratory findings: This patient, for whom the diagnosis was mental deficiency without psychosis, was born on January 13, 1947. The parents were of borderline intelligence and two maternal aunts were mentally defective. The patient was the eldest of three siblings and was followed by a normal brother and a normal sister. The maternal and paternal ages at the time of the patient's birth were 21 and 19 years, respectively; the parents were not consanguineous.

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The patient weighed 112 lb., height was 62½ in., span 60 in., and measurements pubis to crown and pubis to sole were 30½ in. and 32 in., respectively (Fig. 1). Breast development was normal for her age and there was a small supernumerary nipple on the left side. Pubic hair was scanty and there was no growth of axillary hair. Other than a slight bilateral internal strabismus, the remainder of the physical examination showed nothing abnormal.



Fig. 1.—Case 1. Photograph taken when patient was 12 years and 4 months of age.

On gynecological examination (by Dr. Lillian M. Beattie, Department of Obstetrics and Gynecology, University of Western Ontario) the labia majora and minora were found to be normal for early adolescence and the clitoris was small, perhaps a little smaller than normal. The introitus, vagina and cervix were normal for the patient's age, and a uterus of average dimensions was palpable on rectovaginal and bimanual examination. An ovary, prolapsed in the posterior cul-de-sac, could also be felt. Normal menses began at the age of 12 years and 3 months. Thus, the reproductive system appeared to be normal for a girl in early adolescence.

The urinary 17-ketosteroid excretion was low, measuring 1.4, 1.5, 2.2 and 1.9 mg./24 hrs. in four specimens. The excretion of total 17, 21 dihydroxy-20-ketosteroids was 6.2, 7.1 and 5.0 mg./24 hrs. on three occasions, or within the normal range. The urinary excretion of gonadotrophins was also normal, being > 5 and < 10 rat uterine units. I^{131} studies (done by Dr. F. C. Heagy, Ontario Cancer Foundation London Clinic) showed a normal I^{131} pickup by the thyroid of 17% after 24 hrs. However, there was little or no thyroid reserve function, for the repeat pickup of I^{131} , 48 hrs. after injection of 4 units of TSH, was only 15%.

Psychological Examination

The following report was submitted (by Mr. W. R. Watson, psychologist, Ontario Hospital, London):

"The patient sat rigidly and silently throughout testing but in general responded fairly appropriately when asked single questions. She attempted almost everything she was asked to do. Her voice was low, at times inaudible, and her enunciation was not clear. Her level of speech was similar to that of a child first learning to speak; that is, she spoke in phrases rather than sentences. She initiated almost no behaviour on her own during the session and displayed no outgoing affect. Her manner remained passive and withdrawn and it was impossible to tell whether or not she had any grasp of her surroundings until she uttered a reasonably correct answer to simple questions.

"Intelligence Test Performance suggested an I.Q. of about 30 (mental age about 4 years). At this level she could be expected to do only very simple tasks and follow only very simple instructions. Such tasks as reading and writing require a level of conceptual functioning that is a good deal beyond her capacity. Even drawing or copying simple figures is difficult for her because of the visual-motor co-ordinations involved. However, she can count simple objects when arranged together, counting accurately as high as six or seven. She can conceive of such an instruction as to go to a store and buy bread. Her self-concept remains at a simple body image level where she realizes that people have or at least should have two ears, two arms, two thumbs, etc. Her grasp of reality or the world around her parallels this; for instance, she can name and recognize common objects and can realize if they are damaged. She knows that she has a father, mother, brother and sister, but has difficulty remembering their names."

TABLE I.—SEX CHROMATIN STUDY FOR CASE I.

Preparation	Proportion of nuclei (%) with 1, 2 or 3 masses of sex chromatin			Total (%)
	1	2	3	
Buccal smear.....	17	35	43	95
Vaginal smear.....	22	43	30	95
Skin biopsy.....	23	59	17	99

Sex chromatin studies: The sex chromatin was examined in smears from the buccal and vaginal mucosae, stained with thionin, and in sections of a skin biopsy specimen, stained with hematoxylin-eosin and by the Feulgen method. Table I, which contains data obtained from a study of 200 nuclei in each preparation, shows the proportion of nuclei that contained one, two or three masses of sex chromatin. The three kinds of nuclei are illustrated in Figs. 2 and 3. In some nuclei that were recorded as having two sex chromatin masses, one of them was unusually large and probably represented two masses of sex chromatin that had fused together. The extra sex chromatin in the interphase nuclei led to an unusually large proportion of cells (approaching 100%) that were chromatin-positive.

Nuclear morphology in the neutrophil leukocytes had a typical female pattern. There was a drumstick nuclear appendage in 42 out of 1000 cells, the 6th one being found in the 139th neutrophil leukocyte examined. Cells with two drumstick nuclear appendages were not seen. The Arneith Index was 2.7.



Fig. 2.—Nuclei with one, two and three masses of sex chromatin in a vaginal smear. Thionin stain. $\times 2000$.

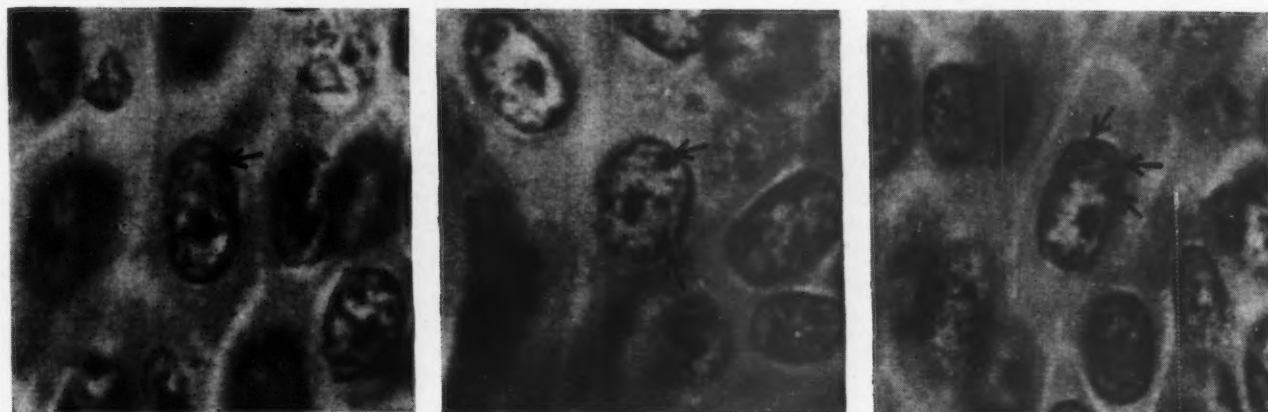


Fig. 3.—Nuclei with one, two and three masses of sex chromatin in a skin biopsy specimen. Hematoxylin and eosin stain. $\times 2000$.

Chromosome study: Chromosomes were studied in cells derived from cultures of leukocytes in the peripheral blood, using a modification of the method of Moorhead *et al.*^{24, 25} Among 110 metaphase plates, 102 of them contained 48 chromosomes (Table II). In the two cells with 49 chromosomes, there were indications that a chromosome had been broken, and the 6 cells with 47 chromosomes showed the deleted chromosome to be from various groups. The few counts of 47 and 49 were probably technical artefacts. In any event, the prevailing chromosome number was 48, or two above the normal diploid number for man.

TABLE II.—RESULTS OF CHROMOSOME ANALYSIS

Case	Number of cells with chromosome counts of:					Total cells counted	Sex chromosome complex
	<47	47	48	49	96		
1		6	102	2		110	XXXX
2	9	15	99		1	124	XXXX

Twenty-one cells containing 48 chromosomes were examined in detail and karyotypes were prepared for 7 of them (Fig. 4). In each cell, the two extra chromosomes were in the 6-12 group. They were interpreted as X chromosomes, giving a karyotype of 44 autosomes and an XXXX sex chromosome complex, which is consistent with the sex chromatin pattern of the interphase nuclei. The disparity in length between the two members of the second pair of chromosomes (Fig. 4) was not considered significant, since it happened to occur in this particular cell and not in others

that were analyzed in detail. There is frequently a difference of up to about 15% in the length of homologous chromosomes, as seen in preparations made by procedures currently in use. This is caused by such factors as a difference in the degree of contraction between the two chromosomes, excessive mechanical extension of one of them on the slide, or foreshortening of a chromosome by a bend along its length and in the plane of the optical axis of the microscope.

CASE 2.—History; physical and laboratory findings: This patient, whose clinical diagnosis was mental deficiency without psychosis, was born on August 1, 1928. She was the youngest of six siblings and had three brothers and two sisters. The mother's age was 41 years and the father's age 39 years at the patient's birth; the parents were not consanguineous. So far as could be learned, there was no history of mental deficiency or mental illness among members of the immediate family. There was a record of prolonged breech delivery, and pneumonia and mastoiditis at the age of 9 years.

The patient weighed 106 lb. Her height was 64½ in., span 64½ in., measurements crown to pubis 30½ in. and pubis to sole 34½ in. (Fig. 5). The breasts were small. There was a moderate amount of pubic hair with a feminine distribution and a small amount of axillary hair. Other than a slight enlargement of the right lobe of the thyroid gland, the remainder of the physical examination was negative.

Gynecological examination showed normal external genitalia and a clitoris of average size. The vagina was normal and the cervix was perhaps a little smaller than

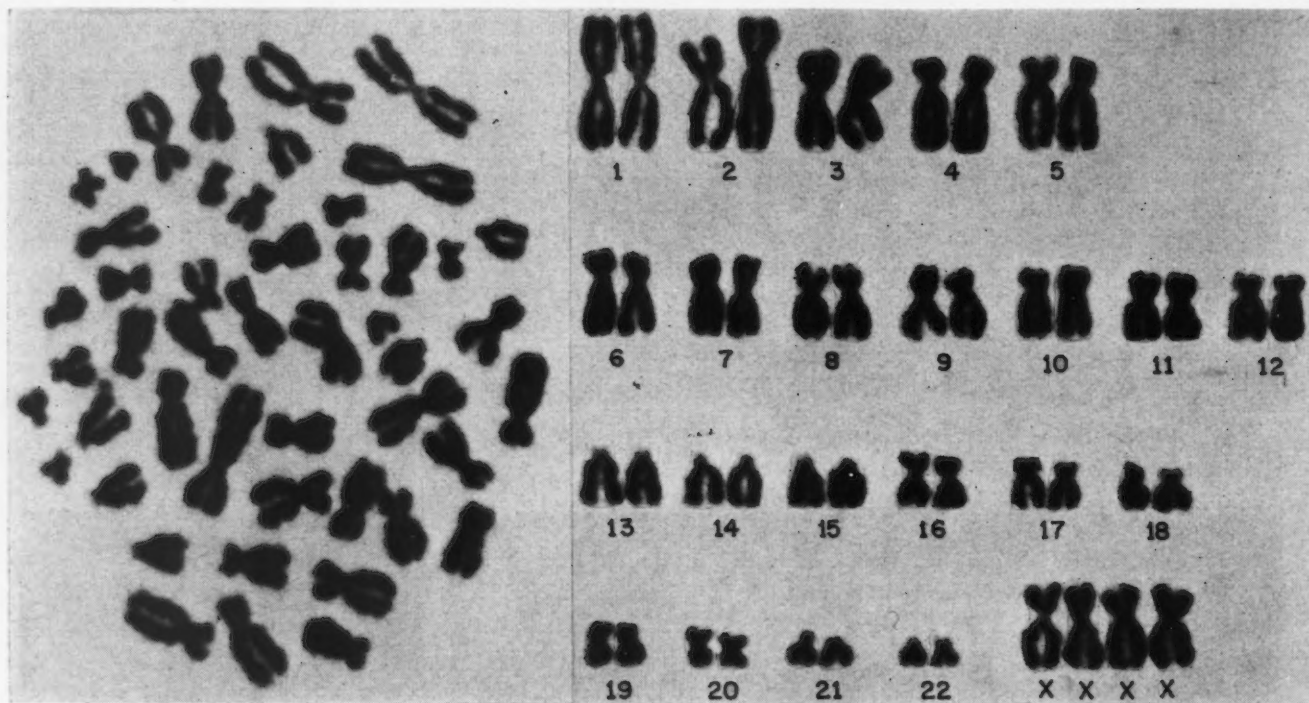


Fig. 4.—Metaphase plate and the corresponding karyotype of a cell containing 48 chromosomes (Case 1). The complement consists of 44 autosomes and an XXXX sex chromosome complex.

usual for the patient's age. Ovaries could not be felt, but there was a normal menstrual history. Thus, the reproductive system had no unusual features, so far as could be ascertained.



Fig. 5.—Case 2. Photograph taken when patient was 30 years old.

The urinary level of 17-ketosteroid excretion on five separate tests was 3.8, 3.3, 4.5, 5.1 and 2.8 mg./24 hrs.,

or at the lower limit of the normal range. The excretion of total 17, 21 dihydroxy-20-ketosteroids was normal, values of 6.3, 4.7 and 4.9 mg./24 hrs. being obtained on three occasions. Gonadotrophin excretion was > 2 and < 5 rat uterine units. I^{131} pickup by the thyroid was 12% after 24 hrs. and 52% 48 hrs. after injection of 4 units of TSH. A photoscan of the thyroid region after TSH administration showed a diffuse distribution of increased activity in the enlarged right lobe.

Psychological assessment: A psychologist (Mrs. C. L. Crone, Ontario Hospital, London) reported as follows:

"The Wechsler Adult Intelligence Scale places this patient on the borderline between moron and imbecile intelligence ranges. Her scores are as follows: Verbal I.Q., 54; Performance I.Q., 51; Full Scale I.Q., 50. Although there is little subtest scatter, the comprehension test (considered to measure judgment) tends to be slightly elevated in relation to other tests.

"While her performance on personality tests is in many ways in accordance with the response expected from a person of defective intelligence, in certain areas her test behaviour is above what would be expected from a person with an I.Q. of 50. One such area is her rather more adaptive approach to the world than one would anticipate. It appears that she would be capable of doing some tasks without supervision and also of modifying her behaviour in terms of her experience. In addition, the patient is capable of differentiating human figures on the Rorschach test. This suggests a perception of herself in relation to other humans. Also, her self-concept appears relatively well established and even sex-role seems more clearly delineated than would be expected.

"While the patient appears to be fairly resilient to emotional stress and childlike aggressive symbols appear to be organized and under control within her own limited ability, her lowest threshold is in the area of

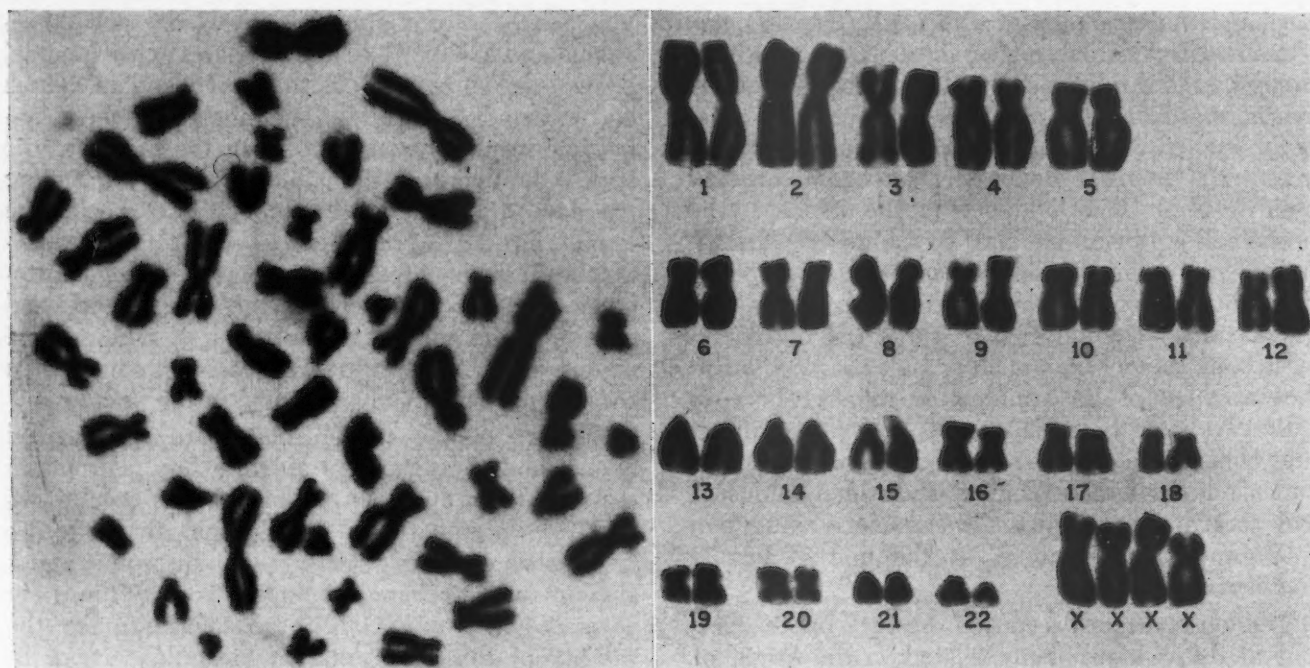


Fig. 6.—Metaphase plate and karyotype from a cell with 48 chromosomes (Case 2). There are 44 autosomes and an XXXX sex chromosome complex.

experienced hostility. Tests indicate that she is likely to become easily angered and one would expect some uncontrolled 'acting out' behaviour.

"In summary, the ego-functioning is decidedly limited by the I.Q. level. Interestingly enough, however, she does produce some test responses of a level rather uncommon for a person of her I.Q. range. These are specifically in the areas of adaptive ability, some limited empathic qualities, sex-role identification and emotional resiliency."

TABLE III.—SEX CHROMATIN STUDY FOR CASE 2

Preparation	Proportion of nuclei (%) with 1, 2 or 3 masses of sex chromatin			Total (%)
	1	2	3	
Buccal smear.....	21	45	23	89
Vaginal smear.....	20	44	33	97
Skin biopsy.....	24	63	7	94

Sex chromatin studies: The sex chromatin counts are recorded in Table III. In the buccal smear and skin biopsy specimen, the proportion of nuclei with three masses of sex chromatin was lower than in Case 1, but the presence of such nuclei in addition to those with two masses was still an unusual feature of the preparations.

There were 19 neutrophils with drumsticks in 1000 neutrophil leukocytes examined, the 6th such cell being the 433rd neutrophil studied. One eosinophil with a typical drumstick nuclear appendage was seen. No neutrophil was found in which there was more than one unequivocal drumstick. The Arneht Index was 2.4.

Chromosome study: Chromosome counts were made on 124 metaphase plates in preparations from leukocytes of peripheral blood (Table II). Of the 99 cells with 48 chromosomes, 23 were examined in detail and karyotypes were constructed for 8 of them (Fig. 6). The two extra chromosomes were consistently in the 6-12 group. In view of the sex chromatin pattern in

the interphase nuclei, they can most logically be interpreted as X chromosomes. Specific identification of the X chromosome, in relation to other chromosomes of comparable size and morphology, is difficult. Even among experienced cytogeneticists, there is considerable variation in data recorded for length and arm ratio of the X chromosome.²⁶ This may reflect the difficulty in identifying the X chromosome or a true biological variation in its size and the position of its centromere.

Since there were 15 metaphase plates with 47 chromosomes, the possibility of an XXXX/XXX mosaicism was considered. Thirteen of the 15 cells were suitable for detailed analysis. The chromosome missing, in relation to cells with 48 chromosomes, varied from one cell to another and in only 4 of the metaphase plates was the missing chromosome in the 6-12 group. Considering that this is the largest chromosome group in the Denver system,²⁶ it is likely that the counts of 47 were either artefacts or inconstant biological variants in a population of cells that was being rapidly renewed. The cell with 96 chromosomes was clearly a tetraploid cell, such as is found occasionally in preparations from blood and other sources. The appearance of the 9 cells with < 47 chromosomes suggested that the cells had been broken, with loss of chromosomes as a technical artefact, although a biological factor may have been responsible for some of them.

In spite of difficulties in accounting with certainty for all cells that departed from the modal chromosome number, the basic chromosome complement in this patient consisted of 48 chromosomes. The most plausible interpretation of the findings, especially in view of the sex chromatin pattern, is that the additional two chromosomes were part of an unusual tetra-X sex chromosome complex.

DISCUSSION

Aside from occasional nuclei that are polyploid, which occur in almost any tissue, the nuclei of

normal females are exactly diploid ($2n: 46$) and contain a single mass of sex chromatin. However, exceptions occur at a few sites where polyploidy is a normal feature of the cells. For example, polyploid nuclei with more than one sex chromatin mass (the number depending on the degree of ploidy) occur in abundance in the liver,²⁷⁻²⁹ the bronchial epithelium³⁰ and the amnion.³¹ Inconstant chromosome complements, including hyperdiploidy, are not uncommon in malignant cells, and a few nuclei contain two or three sex chromatin masses in some tumours in female hosts.³²⁻³⁴ But the presence of an appreciable number of cells with two and three masses of sex chromatin, at sites where the nuclei are predominantly diploid under normal circumstances, is distinctly unusual and probably results from the nuclei having two X chromosomes in excess of the normal female complement.

The observations recorded in this paper raise several difficult problems related to the origin of the sex chromatin, the role of the X chromosomes in gonadal differentiation, and the source of the additional X chromosomes in the nuclei of these patients.

The precise relationship of the sex chromatin to the chromosomes is still a matter that requires further investigation. The weight of evidence favours the derivation of the sex chromatin from elements of the sex chromosome complex rather than from autosomes. This rather crucial point was discussed in some detail elsewhere,³⁵ but it must be touched on again, for the concept of a sex chromosome origin for the sex chromatin strongly influences the interpretation of extra chromosomes when they are in a certain size range.

The only known difference between the chromosome complements of the two sexes is in the sex chromosome complex (XX and XY in nearly all mammals). The sex chromosomes have characteristics that differ from those of the autosomes in male germ cells, in which the XY complex tends to be more condensed and deeply staining (positive heteropyknosis). In many invertebrates, the interphase nuclei have chromatin masses (chromocentres) which are sex-specific and which represent elements of the sex chromosome complex. Chromocentres of sex chromosome origin have been demonstrated in nuclei of some tissues of the bank vole.³⁶ For these and other reasons, it seems very likely that the sex chromatin is of sex chromosome origin.

To carry the analysis a step further, there is increasing evidence that the sex chromatin represents a single X chromosome, part of which is in a state of positive heteropyknosis. Ohno and his collaborators, from their study of prophase nuclei, feel that only one X chromosome is positively heteropyknotic in females of the rat,^{29, 37} mouse³⁷ and opossum,³⁸ and that this X chromosome forms the sex chromatin at interphase. The extension of the foregoing findings to man seems to be legitimate in

view of the recent discovery, by Grumbach, Morishima and Chu,^{18,19} of two females with gonadal dysgenesis, chromatin-positive nuclei and an XO sex chromosome "complex". The nuclei of these unusual patients are reminiscent of the nuclei of the spruce budworm,³⁹ the mulberry silkworm,⁴⁰ and the domestic chicken,^{41,42} for in these species the female has an XO or XY sex chromosome constitution and a sex-specific chromocentre in the interphase nucleus. In man, on the other hand, and perhaps in mammals generally, an X chromosome is not as a rule positively heteropyknotic when there is only one X chromosome in the nucleus.

Because of the studies that were summarized above and the finding of three sex chromatin masses in a proportion of our patients' nuclei, we have interpreted the two additional chromosomes as X chromosomes, rather than autosomes of a similar size and morphology. The findings in patients with an XO/XXX mosaicism make the validity of this interpretation virtually certain. In these patients, in whom duplication of the sex chromatin is clearly demonstrable in buccal and vaginal smears, the extra chromosome in some cells can hardly be other than an X chromosome, for one of the X chromosomes is missing in other cells. The mosaicism probably originates through non-disjunction of an X chromosome during an early mitotic division of the fertilized ovum.

In nuclei with three masses of sex chromatin, it would appear that three X chromosomes display positive heteropyknosis and are thus visible at interphase, while the remaining X chromosome is euchromatic and thus not in evidence. Further, the number of X chromosomes in positive heteropyknosis seems to be variable from one cell to another, for the 35 to 69% of nuclei with two masses of sex chromatin and the 17 to 24% of nuclei with one mass of sex chromatin are unlikely to have resulted entirely from difficulties of technical and interpretative origin. Perhaps individual cells change from time to time or go through cycles, in this respect, the dynamic aspect being concealed in fixed preparations. There is no doubt much to be learned about the sex chromosomes (for example, see Geerts);⁴³ new facts concerning them will be of value to both basic science and clinical investigation.

The discovery of abnormal sex chromosome complexes gives some inkling as to the role of the X and Y chromosomes in gonadal differentiation. In females, there is usually failure of ovarian maturation when there is a deficiency of X chromosome material, as in XO and Xx individuals. Development of ovaries proceeds normally when there are one or two X chromosomes in excess of the normal female complement. But, as a general rule, inclusion of a Y chromosome in the complex causes the indifferent gonads of the early embryo to develop into testes. With rare exceptions, an XY complex results in normal male development, whereas the

infertile male with Klinefelter's syndrome is associated with XXY,^{44, 45} XXXY^{11, 46, 47} or XYY^{48, 49} sex chromosome complexes. There is thus demonstrated the potent testis-promoting influence of the small Y chromosome of man, even though the genetic imbalance produced by combinations of one or two Y chromosomes with two or three X chromosomes causes regressive changes to occur in the testes at puberty.

There are several mechanisms that could, in theory, be responsible for the tetra-X complex.

1. Non-disjunction of the X chromosomes at the reductional division of oögenesis could result in a secondary oöcyte with two X chromosomes. Another non-disjunction in the equational division, involving one of these chromosomes, could produce a mature ovum with three X chromosomes. Fertilization of such an ovum by an X-bearing sperm would produce a tetra-X zygote. If the fertilizing sperm were Y-bearing, the zygote would contain an XXXY complex, such as occurs in an occasional patient with the Klinefelter syndrome.

2. The triplo-X female is fertile and could produce XX-bearing ova. But non-disjunction must occur in either the first or second meiotic division to produce a mature ovum with three X chromosomes. In view of the apparent rarity of the XXX female and the necessity of meiotic non-disjunction, this possibility seems to be remote. It can easily be tested for by studying buccal smears from the mothers of such patients. We were unable to obtain this material in connection with our two patients.

3. Starting from an XX-bearing fertilized ovum, non-disjunction involving both X chromosomes in the first mitotic division would give rise to a blastomere with four X chromosomes and one with no X chromosome. The blastomere without X chromosomes would not likely survive. A similar mechanism, but starting from an XY-bearing zygote, was suggested as a possible explanation for an XYY complex found recently in a patient with Klinefelter's syndrome.⁴⁹

Thus, the origin of the XXXX complex appears to be a complicated form of non-disjunction of the X chromosomes during oögenesis or division of the fertilized ovum. Perhaps a reduced vitality of the ovum (blastophthoria), such as might result from delayed fertilization with over-ripeness of the ovum or from advanced maternal age, increases the likelihood of abnormal chromosome behaviour in cell division.⁵⁰

SUMMARY

Two mentally defective but otherwise normal females had an unusual sex chromatin pattern in their interphase nuclei. In addition to typical sex chromatin-positive nuclei, some contained two and others three, masses of sex chromatin. A chromosome analysis, using the leukocyte method, showed that both patients had 48 chromosomes, or two in excess of the normal

complement for man. The extra elements were considered to be X chromosomes, giving a tetra-X sex chromosome complex.

The additional X chromosomes probably arose through non-disjunction of X chromosomes during oögenesis or an early division of the fertilized ovum. X chromosomes in excess of the normal female complement are apparently compatible with normal maturation of ovaries and other components of the reproductive system, but the tetra-X complex is perhaps an etiological factor in the mental deficiency.

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SURGICAL TREATMENT OF ATRIAL SEPTAL DEFECTS IN CHILDREN*

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THE CORRECTION of atrial septal defects is now a common surgical procedure. In the 12 years since Dr. D. W. G. Murray of Toronto attempted the first surgical closure of this defect, the operation has become relatively safe.¹ Uncomplicated atrial septal defects of the ostium secundum type are now treated by a variety of surgical techniques, with a mortality of about 2%.

The purpose of this article is to review our experience with the surgical treatment of this defect. One hundred and fifty-seven patients with atrial septal defect have been operated upon at the Hospital for Sick Children, Toronto; the defects associated with total anomalous pulmonary venous drainage or with a separate ventricular septal defect are excluded from this review.

I. OSTIUM SECUNDUM ATRIAL SEPTAL DEFECT

One hundred and twenty-one patients with ostium secundum atrial septal defect have been operated upon (Fig. 1). For analysis they may be grouped as follows:

- (a) Isolated ostium secundum defect—102 cases.
- (b) Ostium secundum defect plus partial anomalous pulmonary venous drainage—10 cases.
- (c) Ostium secundum defect plus valvular pulmonary stenosis—6 cases.
- (d) Ostium secundum defect plus abnormal mitral valve—3 cases.

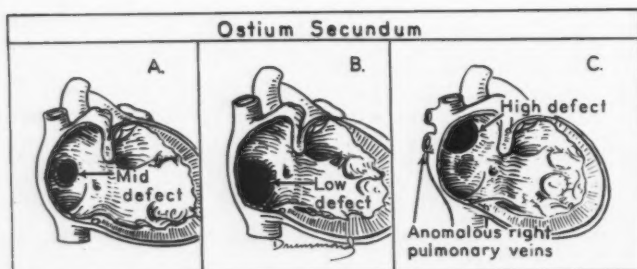


Fig. 1.—Variations in the position of the ostium secundum defects.

A. ISOLATED OSTIUM SECUNDUM ATRIAL SEPTAL DEFECT — 102 CASES

Clinical Picture

There were 65 girls and 37 boys with an isolated ostium secundum atrial septal defect. Their ages varied from 2 to 15 years, the average age being 9 years. Increased breathlessness on exertion was the most common complaint, but many of the

children had no symptoms. Only three of the children had developed mild congestive heart failure. Cyanosis was not seen in an uncomplicated case.

On physical examination the children were noted to be thin but of average height. The second heart sound remained split throughout the respiratory cycle, and the pulmonary component of the second sound was always of normal or increased intensity. A systolic murmur in the pulmonary area was always present, but was rarely associated with a palpable thrill. A soft mid-diastolic murmur at the left sternal border was frequently noted and occasionally a presystolic murmur was heard.²

X-ray and fluoroscopic examination demonstrated a slightly enlarged heart of triangular shape (Fig. 2a). The hilar vessels were prominent and usually pulsatile, and the lung fields had increased vascular markings.

The electrocardiogram in all but two children revealed some variety of the incomplete right bundle-branch block pattern. The "R" wave in lead V₁ was rarely over 16 mm. The mean axis of the QRS complex lay between +60° and -150° in all, and usually between +60° and +150°. The frontal vector of the QRS complex was inscribed in a clockwise direction in every case in which it could be computed.²

Preoperative right heart catheterization, performed in all but three children, demonstrated the typical rise in oxygen saturation at right atrial level.

Surgical Treatment

An open-heart method, utilizing general body hypothermia, was employed in 95 of the 102 cases. Cardiac bypass was used in the other seven cases, because unusual clinical and laboratory findings had led us to suspect other abnormalities.

The technique of hypothermia and inflow occlusion has been modified and changed over the years. At present, a sternum-splitting incision is used, and air surrounding the heart is replaced by carbon dioxide during the period of the cardiectomy.³ After the tourniquets have been tightened on the superior and inferior vena cava and before the clamp on the right atrium is released, the entire heart is compressed to empty it of blood. When the defect is visualized, a suture is placed in its superior margin. Traction on this suture aids in clearer definition of the borders of the defect and accurate placement of a suture at the important inferior margin. The atrial septal defect is then closed by a continuous running silk suture which is not drawn taut until all carbon dioxide has been expelled from the left side of the septum by inflation of the lungs.

Several factors are important in contributing to the present ease and safety of this method. The degree of hypothermia is controlled so that the temperature (rectal and esophageal) does not drop below 28°C. and is usually between 30°C. and 32°C. Heparinized rather than citrated blood is

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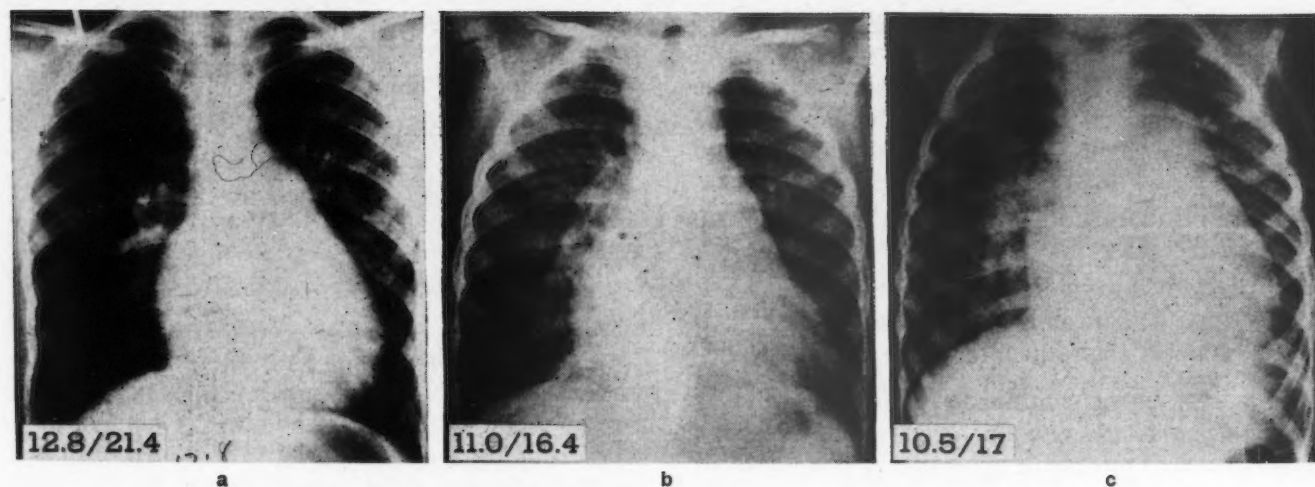


Fig. 2.—(a) Ostium secundum defect in an 11-year-old patient. (b) Ostium primum with cleft mitral valve in a 9-year-old patient. (c) Atrioventricularis communis in a 3-year-old patient.

used for replacement of blood loss during the cardiectomy.⁴ The defect is closed under a "blanket" of carbon dioxide. The operating table is rotated so that the septum is horizontal. The anesthetist injects a relaxant (succinylcholine) to reduce diaphragmatic movement while the heart is open.⁵ The aorta, pulmonary artery, and root of the lung are not clamped; coronary perfusion is not used and a chemical to produce cardiac arrest is not injected.

Postoperative Complications and Hospital Mortality

Complications after this procedure are unusual. In three children, cerebral gas emboli were produced by the trapping of air or carbon dioxide in the left atrium. These children were treated with continuous hypothermia for two to three days, and all have recovered completely.⁶

Significant wound infections are uncommon (one case of osteomyelitis of the sternum and one of staphylococcal pericarditis) and have responded rapidly to treatment. Transient atrial flutter occurred in one patient, but there has been no case of heart block or nodal rhythm after this procedure.

In two children, significant murmurs persisted postoperatively and catheterization confirmed the presence of residual defects. One of these children, in whom the recurrence had probably developed during cardiac massage, was operated upon a second time.

There was one hospital death among the 95 patients undergoing primary closure of their defect by this method. This child, aged eight, died 24 hours postoperatively from cardiac tamponade. Another child, thought to have a significant recurrence of her defect, died from a right atrial tear during a second procedure two years later. The hospital mortality in 95 patients with isolated ostium secundum atrial septal defects treated with the technique of general hypothermia was thus 2.1%. There was one fatality among the seven children treated with the aid of cardiac bypass.

Effect of Pulmonary Hypertension

Only 4 of the 102 children with isolated ostium secundum atrial septal defects described above had pulmonary systolic pressures of over 50 mm. Hg. These children usually had symptoms and signs of greater severity. One exhibited cyanosis on exertion, two had a dominant "A" wave in the jugular pulse, and the "R" wave in lead V₁ of the electrocardiogram was over 16 mm. in every case.² Their average age at time of operation was seven years. Two of the four children were operated upon with the hypothermic technique described above and have done well. The other two were operated upon with the aid of cardiac bypass and one died suddenly on the eleventh postoperative day. The cause of this death is unknown.

B. OSTIUM SECUNDUM ATRIAL SEPTAL DEFECT ASSOCIATED WITH PARTIAL ANOMALOUS PULMONARY VENOUS DRAINAGE — 10 CASES

There were no distinctive clinical features which allowed recognition of the presence of associated anomalous pulmonary veins before cardiac catheterization.² At right heart catheterization, veins entering the superior vena cava were easily recognized, but those entering the right atrium were occasionally missed. The average age at time of operation was nine years. Two of these children had pulmonary systolic pressures of over 50 mm. Hg.

Although it is possible to correct completely most varieties of this anomaly with the hypothermic technique (two of the ten cases), we prefer to operate on such patients with the aid of the heart-lung pump. In this anomaly, the atrial septal defect tends to be placed very high in the atrial septum—the "sinus venosus" defect (Fig. 1c). The anomalous veins entered the superior vena cava only (three cases), the right atrium only (four cases), or both superior vena cava and right atrium (three cases). If a small vein carrying less than half the venous return of the right lung enters very high in the superior vena cava, it may be wise to leave it

(one case).⁷ The presence of a large left superior vena cava (two cases) will allow the ligation of the right superior vena cava above the entry of a pulmonary vein, if necessary. In three children a plastic patch was used to direct the blood through the atrial septal defect to the left atrium.

One child died suddenly on the third postoperative day; the other nine are doing well.

C. ATRIAL SEPTAL DEFECT ASSOCIATED WITH VALVULAR PULMONARY STENOSIS — 6 CASES

The presence of significant pulmonary valvular stenosis associated with an atrial septal defect is usually easy to recognize clinically. A systolic thrill was present in the pulmonary area in all cases. The pulmonary component of the split second sound was not only delayed but was always abnormal in quality — either "soft" or "snapping".² Cyanosis on exertion and a dominant "A" wave in the jugular venous pulse were more common than in the isolated ostium secundum atrial septal defect. The "R" wave in lead V₁ of the electrocardiogram was over 16 mm. in two-thirds. At preoperative right heart catheterization, the systolic gradient across the pulmonary valve was between 52 and 77 mm. Hg.

Although two of the children were operated upon with the aid of cardiac bypass, we prefer to correct this lesion with the hypothermic technique. The pulmonary valve is opened first and then, with a second period of inflow occlusion, the atrial septal defect is closed. All of the six children are well. Two have been catheterized postoperatively and have systolic gradients across the pulmonary valve of 0 and 11 mm. Hg.

D. OSTIUM SECUNDUM ATRIAL SEPTAL DEFECT ASSOCIATED WITH ABNORMAL MITRAL VALVE — 3 CASES

The presence of congenital mitral stenosis with an atrial septal defect (two cases) is unfortunate.⁸ The left ventricle is underdeveloped and when called upon to accept the full pulmonary venous return, frequently fails. One child (aged 18 months) died from pulmonary congestion on the second postoperative day and the other (aged 6 years) had a very stormy postoperative course. A third child (aged 9 years) had associated mitral incompetence of rheumatic origin and was treated without difficulty. We believe that any patient with suspected mitral valve pathology should undergo corrective surgery with the aid of cardiac bypass.

II. OSTIUM PRIMUM ATRIAL SEPTAL DEFECT

Thirty-six children with ostium primum atrial septal defects have been operated upon. It is only in the last five years that the embryology, clinical features and possible varieties of this defect have been clearly portrayed.⁹ The defects form a spec-

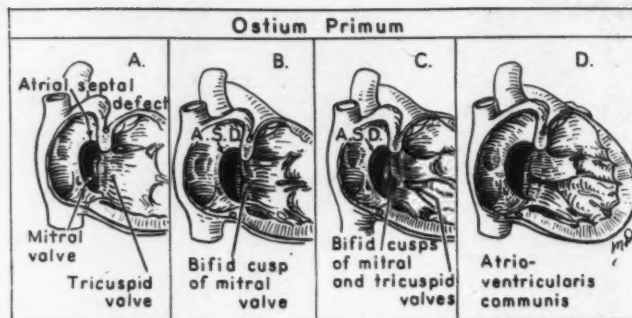


Fig. 3.—Three variations in the pathological anatomy of ostium primum A, B, and C. The complete atrioventricular canal with ventricular septal defect (D).

trum running from the relatively benign isolated ostium primum atrial septal defect to the very serious atrioventricularis communis (Fig. 3). The 36 cases have been divided into the following groups:

- (a) Isolated ostium primum atrial septal defect — 3 cases.
- (b) Ostium primum atrial septal defect with associated cleft in the aortic leaf of the mitral valve — 17 cases.
- (c) Ostium primum atrial septal defect with associated cleft in both the aortic leaf of the mitral valve and the septal leaf of the tricuspid valve — 3 cases.
- (d) Atrioventricularis communis — 13 cases.

A. ISOLATED OSTIUM PRIMUM ATRIAL SEPTAL DEFECT — 3 CASES

Although the left-to-right shunt was usually greater, the clinical picture of the children with this defect was very similar to those with an ostium secundum defect.² On clinical examination there was no evidence of mitral or tricuspid valvular dysfunction, and a dye dilution curve from the left ventricle, performed in one case, was normal. The electrocardiogram is a vital diagnostic instrument in this lesion. The axis of the QRS complex was negative and the frontal vector loop counter-clockwise in two cases; in the third case the axis was indeterminate and the vector loop inscribed a "figure of eight" about the horizontal plane. In only one case was the low position of the defect noted at catheterization. The pulmonary systolic pressure in each child was less than 50 mm. Hg. One child had an associated ostium secundum atrial septal defect and mild valvular pulmonary stenosis.

These defects are situated anteriorly in the atrial septum (Fig. 3). The inferior margin is formed by the tissue between the mitral and tricuspid valve rings. The atrioventricular node and the bundle of His run near the inferior border of the defect and are in great danger during surgery.

Although the diagnosis was not suspected preoperatively in two children, and the hypothermic technique was used (June and October 1958), we prefer to use cardiac bypass in all such lesions. The

sutures in the inferior rim of the defect must be placed very carefully, and a plastic patch may be required to avoid tension. One patient suffered transient complete heart block, but at present all three are doing well.

B. OSTIUM PRIMUM ATRIAL SEPTAL DEFECT ASSOCIATED WITH A CLEFT IN THE AORTIC LEAFLET OF THE MITRAL VALVE — 17 CASES

Although disability tends to be greater and occur earlier in these children than in those with an isolated atrial septal defect, one-half of the children had few symptoms apart from slight breathlessness on exertion. Five children had definite cyanosis on exertion.

An apical pansystolic murmur transmitted to the axilla was present in the majority and half had a distinct left ventricular cardiac impulse. The cardiothoracic ratio was larger than in the ostium secundum defects (Fig. 2b) and in 14 the left atrium was noted to be enlarged at fluoroscopy. The electrocardiographic findings in each case were compatible with an ostium primum lesion. All cases were catheterized; in only two was the pulmonary systolic pressure over 50 mm. Hg.

In May 1954, an attempt was made to close one of these defects by a closed method, and an operative death resulted. The other 16 cases have been corrected with the aid of cardiac bypass. Three hospital deaths have occurred, one from pulmonary hypertension and right heart failure and two from pulmonary congestion. The average age at time of operation was seven years.

The greatest possible care must be taken in obtaining an adequate repair of the mitral valve. Unless the atrial septal defect is very small, it is much better to insert a plastic patch than to place sutures under tension. The conducting tissue is always in danger; there was one case of complete heart block which reverted to sinus rhythm on the fifth postoperative day.

C. OSTIUM PRIMUM ATRIAL SEPTAL DEFECT ASSOCIATED WITH A CLEFT IN THE LEAFLET OF THE MITRAL VALVE AND THE SEPTAL LEAFLET OF THE TRICUSPID VALVE — 3 CASES

The absence of a significant ventricular septal defect below the deformed valves separates this lesion from atrioventricularis communis. However, in both of these lesions, the surgeon is handicapped by the frequent absence of sufficient valvular tissue to allow an adequate repair (Fig. 3c).

These children tend to have serious disability early in life and are presented to the surgeon while they are very small; the average age was two years. The cardiothoracic ratio was over 60% in all. At catheterization, the pulmonary systolic pressure was over 50 mm. Hg in all three and over 75 mm. Hg in two. In each case the electrocardiographic findings were compatible with an ostium primum lesion.

This anomaly should be corrected with the aid of cardiac bypass. There have been two hospital deaths (one patient, aged 7 months, and another, aged 13 months). The one surviving child (operated upon at age 5) is improved but has evidence of a persistent defect.

D. ATRIOVENTRICULARIS COMMUNIS — 13 CASES

Children with this anomaly are seriously ill and very few will live beyond the age of four years.⁸ The large pulmonary blood flow leads to marked pulmonary congestion and frequent pulmonary hypertension; in all but 2 of the 13 cases, the pulmonary systolic pressure exceeded 50 mm. Hg and in the majority it approximated systemic pressure. In each case, the axis of the QRS complex was negative (-60° to -140°) and the frontal vector counterclockwise.²

The surgeon's task is very difficult. He must repair the ventricular and atrial septal defects without producing heart block. He must also repair the mitral and tricuspid valves where there is often a lax valve ring as well as inadequate valvular tissue. All of the above must frequently be performed on a very small and very ill patient. The average age at time of operation was three years.

The first five children, operated upon before 1958, all died during the operation or within 12 hours postoperatively. Since January 1958, seven children have had this lesion corrected and four have survived. Two have excellent results; two are slightly improved over their preoperative state and one of these has persistent heart block. In June 1960, an infant of eight months was treated by "banding" the pulmonary artery in order to decrease the left-to-right shunt and to protect the lungs. She is improved.

DISCUSSION

The use of general body hypothermia for cardiac surgery was suggested and shown to be feasible by W. G. Bigelow in 1950, and in 1952, F. J. Lewis performed the first successful "open" repair of an atrial septal defect, using this method. Although several other methods of closing these defects are available, we believe that this is the method of choice for dealing with isolated ostium secundum atrial septal defects or with isolated ostium secundum atrial septal defects associated with valvular pulmonary stenosis. The methods of cardiological investigation are such that the diagnosis in these lesions can now be made with great accuracy. The presence of partial anomalous pulmonary venous drainage to the superior vena cava can be ruled out in most cases by a brief but careful cardiac catheterization. If an unsuspected pulmonary vein enters the right atrium, it can usually be dealt with in the time available with this technique. Preoperative knowledge of anomalous pulmonary veins, mitral valve lesions, or any member of the ostium primum complex requires the use of cardiac bypass.

Although there is some discrepancy among various statements concerning the average age of death in patients with ostium secundum atrial septal defect,¹⁰⁻¹² certainly a large percentage of such patients will be in distress by the age of 40.¹² The mortality resulting from the surgical closure of uncomplicated cases of this defect is now approaching that of patent ductus arteriosus.¹³ Although there is no great urgency for surgery, a child in whom the diagnosis of this defect is made should have it corrected unless there are definite reasons to the contrary.

The patients with ostium primum lesions will develop more severe symptoms at an earlier age. Their age of death will vary greatly, depending on the anatomy of the defect, the nature and the reaction of the pulmonary vasculature, and the excellence of medical care. The morbidity and mortality associated with the surgical closure of this defect are higher than with the ostium secundum group, but are steadily decreasing. The procedure of pulmonary artery "banding" in the first few months of life, as advocated by Sirak, may allow a greater number of these children to survive to an age where total correction can be more safely attempted.¹⁴

SUMMARY

The experience of the group at the Hospital for Sick Children, Toronto, with the surgical closure in 157 cases of atrial septal defect is reviewed. There were only 2 deaths among 95 children with isolated ostium secundum atrial septal defects operated upon with the technique of general hypothermia. This technique is also recommended for the ostium secundum atrial septal defect associated with valvular pulmonary stenosis. Cardiac bypass should be utilized if anomalous veins are present, if the mitral valve is abnormal, or if the defect is of the ostium primum type.

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PUBLIC OPINION ON CANCER IN CANADA: A SECOND SURVEY

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SINCE 1948, the Canadian Cancer Society has conducted a lay education program to teach people the facts about cancer in the expectation that a well-informed public will seek medical attention promptly should any abnormality of body function appear. In an attempt to assess the success of such a program the Society conducted a national survey in 1954 among Canadian women.³ This survey made use of a questionnaire designed for a similar study in Manchester, England, by Paterson and Aitken-Swan.¹ Hence comparisons between the two countries were possible, as well as a measure of the knowledge of Canadian women about the disease. The results of the survey were studied by the Canadian Cancer Society and the emphasis of the program was directed at areas of weakness.

In order to measure differences which may have occurred since the first survey and the subsequent modification of the lay education effort, a second

survey was conducted during the summer of 1960. As before, only women were included, and the survey was undertaken by Canadian Facts Limited, an independent organization. Some of the questions asked in the 1954 study were repeated in order that comparisons could be made, but other questions were included to obtain new information.

The survey was based on a sample of 2000 women over 20 years of age. This sample was distributed in cities and rural areas in each province in accordance with the distribution of population. Approximately 20% of the sample lay in each decennial age-group; 82% were married women; 60% had children, 63% were in the middle socio-economic group and 80% were housewives. Of the total, 1432 were from urban areas. The questions asked were directed towards general attitudes to serious diseases, knowledge of cancer symptoms, knowledge of the causes, treatment and prevention of cancer, and attitudes about cancer information. The results are presented under these headings.

RESULTS

Part I — General attitudes to serious disease

(1) "What disease would you say kills most people in this country?"

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	1954	1960	Actual
Heart.....	40%	50%	46,009
Cancer.....	45	44	21,795
Tuberculosis.....	9	3	883

It will be noted that, although the proportion saying cancer has remained constant, there has been a 10% increase in those who consider heart trouble as the leading cause of death. The vital statistics for Canada (1958) show 21,795 deaths from cancer and 46,009 deaths from heart disease.

(2) "What to you is the most serious of the following diseases—heart trouble, tuberculosis, asthma, cancer, rheumatism?"

The respondents were asked to rank the five diseases in order of seriousness, and a weighted cumulative rank was obtained by assigning five to the first rank, four to the second rank and so on.

CUMULATIVE RANK

	1954	1960
Cancer.....	31%	30%
Heart.....	25	28
Tuberculosis.....	21	19
Asthma.....	12	12
Rheumatism.....	11	11

In the present survey the gap between heart disease and cancer has been reduced, which may indicate the increasing recognition that cancer may be less fatal than heart disease. The unweighted rankings showed that 67% of women in 1954, and 60% in 1960, thought that cancer was the most serious disease, while 24% in 1954, and 36% in 1960, thought that heart trouble was the most serious.

(3) "Can cancer be cured or not?"

	1954	1960
Usually or sometimes.....	63%	71%
Never.....	30	27
Don't know.....	7	2

(4) "Do you think early treatment increases the chance of a cure or doesn't it make any difference?"

	1954	1960
Cancer.....	80%	87%
Heart trouble.....	84	88
Tuberculosis.....	98	99
Asthma.....	61	68
Rheumatism.....	66	68

In this section of the survey on attitudes to serious diseases there are two key questions, one concerned with the curability of cancer and one with the value of early treatment. In each of these the increases in the proportion of women who believe

that cancer can be cured and who believe early treatment important are statistically highly significant ($p = < 0.001$).

Part II — Knowledge of cancer symptoms

(5) "If a friend told you she had a lump in the breast, what would you think it meant?"

	1954	1960
Cancer mentioned.....	62%	76%
Tumour or growth.....	20	12
Other answers.....	23	24
Don't know.....	14	3

(6) "What is the first sign of cancer of the breast?"

	1954	1960
Lump.....	77%	87%
Other signs.....	15	22
Don't know.....	12	6

(7) "What is the first sign of cancer of the womb?"

	1954	1960
Bleeding or discharge.....	66%	66%
Pain.....	12	7
Other.....	15	15
Don't know.....	20	24

The results of the questions relating to knowledge of cancer symptoms indicate that Canadian women are much better informed about cancer of the breast than cancer of the womb. In the present survey only 3% of women did not know the significance of a lump in the breast and only 6% did not know the first sign of breast cancer. For cancer of the womb 24% did not know the first sign.

Part III — Knowledge of the causes, treatment and prevention of cancer

In this section a number of statements relating to the cause of cancer were presented and the respondents asked to signify agreement or disagreement with each statement. A substantial proportion of women still think that living with cancer patients, lack of cleanliness and bad living cause cancer. However, there has been some advance in education regarding possible action to prevent cancer.

(8) "Do you think there is anything you can do to prevent yourself from getting cancer?"

	1954	1960
Frequent check-up.....	17%	26%
Early diagnosis of any trouble.....	2	4
Cut down smoking.....	3	5
All others.....	20	12
Can do nothing or don't know.....	65	58

In the 1954 study, 65% of women said that nothing could be done or they didn't know of anything to prevent cancer. This figure was 58% in the 1960 study. Although a good deal of attention is given to periodic examinations in the educational program, only one-quarter of the women in 1960 mentioned this as a possible action to prevent cancer. The widespread publicity given to smoking and lung cancer seems to have had little effect, since only 5% of women mentioned cutting down smoking in their replies to this question.

Part IV — Attitudes about cancer information

(9) "Do you think there should be freer public discussion of cancer?"

Both surveys showed that approximately 90% of women favoured freer public discussion of cancer.

(10) "Should a doctor tell a person frankly when he is sure she has cancer?"

In 1954, the survey showed that 42% of the women either thought a doctor should not tell a patient that she had cancer or were not prepared to give an opinion. In 1960, this proportion was 25%. This means that the proportion who believe that the doctor should be frank in this regard has increased from 58% to 75%.

In Canada, the Cancer Society has promoted the discussion of cancer in public gatherings, believing that knowledge about the disease would reduce cancerophobia which is often caused by ignorance. This phase of the lay education program is increasing constantly, and the surveys have shown justification for this method of approach since approximately 90% of women favour even freer public discussion of the disease. Regarding the question concerning a doctor being frank with a patient, it must be remembered that the respondents were not cancer patients, hence the opinions should be interpreted with caution.

Part V — Questions asked in the 1960 survey only

(11) "Do you remember any of the danger signals which the Cancer Society suggests may mean that cancer is present?"

	Percentage
(a) A lump or thickening of the breast or elsewhere. . . .	77
(b) Unusual bleeding or discharge.	65
(c) A sore that does not heal.	32
(d) Persistent hoarseness or cough.	29
(e) Persistent changes in bowel or bladder habits. . . .	25
(f) Persistent indigestion or difficulty in swallowing. . .	20
(g) Change in a wart or mole.	20
(h) Could not recall any.	15

(12) "What reasons do you think people have for delay in seeking treatment?"

Fear was given as the chief reason for patient delay by 75% of the women interviewed. Ignorance

was cited by 20% and expense by 12%. The high proportion of women mentioning fear as the important deterrent in this question seems to dispute the theory that the economic factor is the chief cause of delay in seeking treatment.

(13) "Many doctors recommend that women examine their breasts monthly. Do you do so?"

The Cancer Society has distributed a film on this subject, which has been accepted widely. However, 80% of the women indicated that they did not conduct such an examination.

(14) "What are the most important sources of your information about cancer?"

The replies to this question may be summarized as follows:

	Percentage
(a) Television.	53
(b) Newspapers.	35
(c) Pamphlets.	27
(d) Experience with the disease.	24
(e) Conversation.	23
(f) Radio.	16
(g) Discussions.	14
(h) Magazines.	10
(i) Meetings.	7

The survey has shown that, of the seven danger signals, two are recalled best and these relate to breast and uterine cancers. This is probably due to the emphasis which has been placed on these two sites in the educational program for women and perhaps, also, because these are the first two signals mentioned in the list of seven. With respect to the various sources of cancer information, the Cancer Society directs much of its attention to printed pamphlets and the radio. However, the results of the survey indicate that the returns from this effort are not as great as were expected.

DISCUSSION

Since 1948, the Canadian Cancer Society has pursued a lay education program aimed at teaching the recognition of cancer symptoms and the importance of early diagnosis and treatment. The assessment of the success of such a program is difficult since the only true measure lies in whether or not people act upon their knowledge and seek medical advice more promptly. The clinicians in provincial cancer treatment centres in Canada agree that the proportion of early cases of cancer has increased considerably over the past ten years, but the portion of this increase to be attributed to lay education is impossible to assess, since diagnosis and treatment have become government-supported in many provinces during this time. Many other factors may affect this proportion also.

A different method of assessing lay education is through the medium of a public opinion poll. Here the information obtained does not indicate

whether or not the educational effort motivates action, but it does give a measure of the educational information retained by those exposed to the program—in this instance the women of Canada. In addition a poll permits the expression of opinions about cancer, and these are valuable to those concerned with the content of the program. The two surveys among Canadian women indicate progress in the dissemination of cancer information. The proportion who believe that cancer can be cured has increased significantly, as has the proportion who recognize the value of early treatment. It appears also that Canadian women recognize the relative importance of heart disease compared to cancer insofar as the mortality from each is concerned, although cancer is considered the more serious of the two.

Much of the literature produced by the Canadian Cancer Society for public distribution lists seven danger signals which may be indicative of cancer. Two of these, a lump in the breast and unusual bleeding or discharge, were recalled by over two-thirds of the women, and less than one-third could recall any of the remaining five. Associated with this is the information that one in four mentioned pamphlets as the source of her cancer information, whereas over half of the women mentioned television and over one-third mentioned newspapers. These findings indicate the need for an evaluation of the various media used in the educational program. It may be that the pamphlets, used so extensively by the Cancer Society, should be concerned with information of a specific nature, e.g. a site of cancer, an age-group, etc., leaving general information about the disease to other media.

It has been mentioned that the first Canadian survey was patterned after one undertaken in Manchester, England. Since that time the Manchester Committee on Cancer has conducted an experimental scheme of public education using a control and experimental area. After five years of intensive educational effort in the experimental area a survey was made to compare the knowledge

and opinions about cancer in the two areas. The report of this study by Paterson and Aitken-Swan² shows some significant improvements in the experimental area. However, where comparisons are possible between the two countries, certain problems appear which are common, chiefly in the general ignorance about cervical cancer.

SUMMARY

In 1954, the Canadian Cancer Society undertook a survey of the knowledge that Canadian women possess about cancer by submitting a questionnaire to a representative sample of women. This survey, with some modification of the questions asked, has been repeated in 1960. The results of the two surveys are compared.

There has been a significant increase in the proportion of women who think that cancer can be cured and who think that early treatment increases the chance of cure. Cancer is considered more serious than heart disease, but approximately 45% of women in each survey think that cancer is the leading cause of death. This is incorrect since, in Canada, heart disease accounts for more than twice as many deaths as cancer.

Knowledge about cancer of the breast is greater than that about cancer of the womb in both surveys but there has been an appreciable increase since 1954 in the knowledge about cancer of the breast, while little progress appeared in knowledge about cancer of the womb. Nevertheless 80% of the women do not examine their breasts regularly.

Fear is the major reason for delay in treatment and was mentioned by 75% of the women interviewed. Over one-half of the women thought that nothing could be done to prevent cancer, while 80% said that the cause of cancer was not yet known.

Only two of the seven danger signals of cancer were known by over two-thirds of the women. Approximately one-third mentioned one or more of the remaining five. Only one woman in four mentioned pamphlets as her chief source of cancer information, while over one-half mentioned television.

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PAGES OUT OF THE PAST: FROM THE JOURNAL OF FIFTY YEARS AGO

It has not escaped notice that all important scientific observations have been recorded with a singular fitness of words. The best scientists have been the best writers upon science. Huxley, Tyndale and Osler are good writers of English, because the style of each is inseparable from the man. His way of writing is part of himself, since a pen is not a machine which proceeds automatically, once it is set in motion. It must be governed by a hand which, in turn, is directed by a mind.

There are three kinds of writers: those who never think at all; those who think only as they write; and those who have thought before they take the pen in hand. Careful

observers belong in the last category, and that is the reason why they write so well. Poor writers employ phrases. Good writers employ words; and they compel each word to give a proper account of itself. They put it to the question. They scrutinize it with the same care as they exercise towards the fact which they propose to describe. If it is weak, or worn, or superfluous, they cast it aside, as a good craftsman rejects imperfect material. Their writing, then, has symmetry and strength, and fitness for the work which it is intended to perform.—Excerpt from an editorial, "Style in Medical Writing", *Canadian Medical Association Journal*, 1: 70, January 1911.

GRANULOMA FACIALE

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GRANULOMA FACIALE is a rare dermatosis which presents a problem in differential diagnosis. Formerly known as eosinophilic granuloma of the skin, the condition was separated by Pinkus¹ in 1951 from a heterogeneous group of disorders related only by the presence of tissue eosinophilia. In 1952 Pinkus² reported three new cases and reviewed the medical literature. He concluded that a total of 29 cases, including those in his report, had been recognized at that time. Subsequently additional examples have been recognized in several countries. In 1959, 15 cases were described by Johnson *et al.*³

It is considered that the group of reticulo-histiocytoses (Letterer-Siwe type, Hand-Schüller-Christian type and eosinophilic granuloma of bone) is unrelated to granuloma faciale.

Three patients with granuloma faciale, seen in the past year, will be discussed, with a comment on the differential diagnosis of this condition. It is believed that these are the first cases reported from Canada.

CASE 1.—N.N., a white housewife aged 51, first noticed a red patch on the skin of the left nasolabial fold 12 years ago. Eleven years ago, this was treated by radium, and temporary paling of the red colour was noted but the lesion persisted. Ten years ago, two similar patches appeared on the left cheek, anterior to the lobule of the pinna; these enlarged and coalesced to form a single patch. Seven years ago, similar patches appeared on the left temple, left lower cheek and right cheek. Treatment by radium and roentgen therapy was unsuccessful. The lesion first noted on the left nasolabial fold was excised but recurred in and around the scar of excision. Six months ago a brownish red papule appeared on the right forehead. The patient noted some swelling and "pulsing" of the affected skin during emotional excitement and ingestion of stimulants.

The patient was of medium complexion with light brown eyes. Koilonychia had been present since childhood. The lesions (Figs. 1 and 2), one on the right and five on the left side of the face, were similar smooth, soft, slightly elevated, nontender, oval, brownish erythematous plaques. The patch on the left nasolabial fold surrounded a surgical scar. A punch biopsy scar may be seen in the patch on the left temple (Fig. 2). The histological appearance of the biopsy was consistent with a diagnosis of granuloma faciale (Figs. 3(a) and (b)).

The patient was followed up closely after the onset in 1948 for 12 years (by Dr. L. A. Patterson), and the following summarizes the findings. The patient was born in Siberia and came to Canada at age 19. She



Fig. 1

had running ears after childhood scarlet fever. She had two children alive and well; a third was stillborn. In 1948 she complained of palpitations which were due to extrasystoles. There was exogenous obesity (weight 203 lb.). Blood pressure was 136/64. Laboratory examinations revealed a hemoglobin value of 12.3 g./100 ml., a total leukocyte count of 8150 per c.mm. with a normal differential count (eosinophils 3, 3, 3, 1 and 2% in five counts), an erythrocyte sedimentation rate (Westergren, uncorrected) of 43 mm. in one hour and a negative Kahn test, *Brucella abortus* agglutination test, tuberculin test, urinalysis and Bence-Jones urine test. Radiographs of the hands and a gall-bladder series were negative. In the right costovertebral angle there was a mottled circular calcific density 11 mm. in diameter, the identity of which was not clear but which appeared related to the hilum of the right kidney. A radiograph of the chest was reported as



Fig. 2

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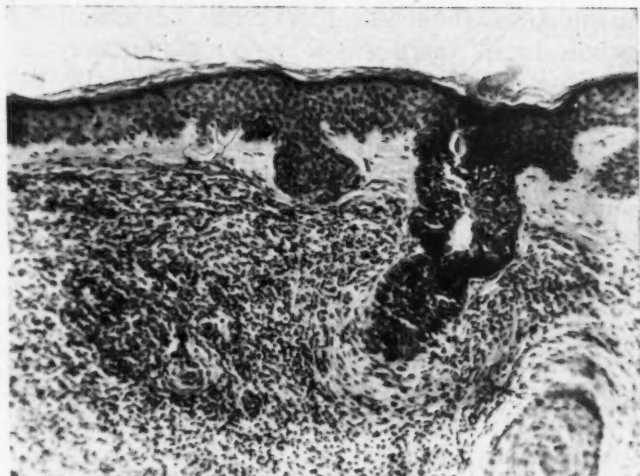


Fig. 3(a).—Case 1. Heavy inflammatory infiltrate situated in the upper two-thirds of the dermis and separated from the epidermis by narrow "grenz" zone of uninvolved dermis.

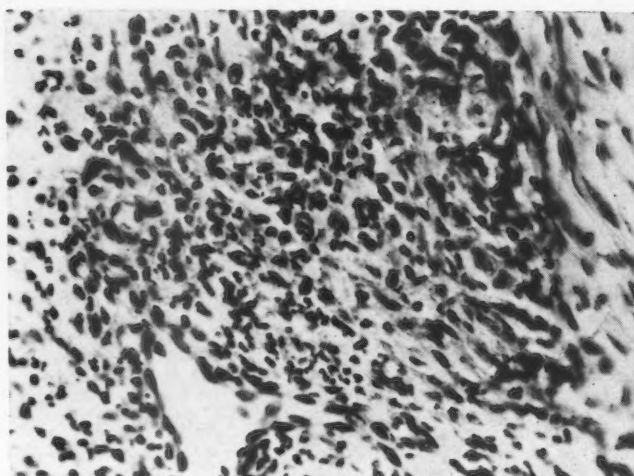


Fig. 3(b).—Case 1. Inflammatory infiltrate consisting of an admixture of neutrophilic and eosinophilic polymorphonuclear leukocytes, lymphocytes, plasma cells and histiocytes.

follows: "A coarse reticular type of infiltration of both lung fields, more dense in the lower two-thirds of the left lung. The extreme apices are free. Two calcified deposits in the right hilum. The hilar shadows are accentuated. Cardiac shadow within normal limits. No bony defects." Bronchoscopy revealed narrowing of the left bronchus beyond the left upper lobe bronchus. The mucosa was edematous here and bled easily. Scrapings and aspirated material showed normal mucosa. Cultures were negative for *M. tuberculosis* and fungus. During the period 1948 to 1957 the erythrocyte sedimentation rate on several occasions was 39 to 68 mm. in one hour, averaging 54 mm.

In 1957 her weight was 210 lb. and blood pressure was 160/90 mm. Hg. The antistreptolysin titre was 12 Tod units. A radiograph of the dorsolumbar spine and pelvis was reported as follows: "Moderate osteoarthritic lipping at dorsolumbar junction. Transitional lumbosacral vertebral body. Shadow 3.5 cm. in largest diameter: anterior to sacrum: possibly a calcified lymph node." A review of radiographs taken during the 12-year period was reported (by Dr. D. Mowat) as follows: "Radiographs were taken at regular intervals. In January 1950, a slight generalized clearing of the infiltration was noted. By November 1950, there had been marked clearing, and only what appeared to be slight residual pulmonary fibrosis remained. The calcification in the right hilar area persisted and the right major fissure line was slightly thickened. During 1950-59, yearly radiographs showed no change. The tentative diagnosis was pulmonary sarcoidosis, chiefly because the patient had widespread pulmonary disease but remained clinically well."

Treatment during this time consisted of administration of vitamin E 200 mg. weekly for 12 weeks in 1948, hydroxychloroquine sulfate (Plaquenil) 200 mg. twice daily for two months in 1958 and 1959, once daily for one month followed by chloroquine diphosphate (Aralen) 250 mg. twice daily for two months, and an injection of suspension of hydrocortisone acetate on two occasions, into the recent papule on the right forehead. During hydroxychloroquine therapy the patient reported absence of swelling and "pulsing" of the lesion, but there was no objective change.

CASE 2.—L.C., a white man, aged 55, noted a red patch on the skin of the left temple four years ago, possibly following a blow, and shortly afterwards

similar patches developed on the left cheek and left side of the nose. These lesions were symptomless but increased slowly in size. Two years ago the patch on the left temple was excised. The excision was designed to remove the whole lesion, and complete removal appeared likely from the microscopic examination of the section. Despite this, the lesion recurred in and around the scar of excision. The patient had undergone excision of tuberculous cervical lymph nodes as a child. He had mild diabetes mellitus controlled by diet therapy.

The patient was of fair complexion with blue eyes. The lesions, measuring 2 cm. in diameter on the left temple and 1 cm. in diameter on the left cheek and left side of the nose, were similar, smooth, soft, slightly elevated, non-tender, brownish erythematous plaques (Fig. 4). The general physical examination was negative.

The laboratory findings revealed a leukocyte count of 7500 per c.mm., the differential count being normal except for an eosinophil count of 5%. The hemoglobin value was 14.0 g./100 ml., erythrocyte sedimentation rate 18 mm. in one hour, and the V.D.R.L. negative; urine contained 1+ reducing substance, and a radiograph of the chest was reported normal. No treatment was given.

CASE 3.—J.K., a white man, aged 58, noted a brown mark on the left forehead three years ago. One year ago examination revealed a brown pigmented, flat, indefinitely outlined patch, 2 x 1.1 cm., which was considered to be actinic melanosis. Six months ago, the patch had become slightly elevated and changed to a reddish-brown colour.

The patient was of medium complexion with greying dark brown hair and hazel eyes. On the left side of the forehead a smooth, soft, slightly elevated, non-tender, brownish erythematous plaque 2 cm. x 1.1 cm. was present; a similar flat patch 0.3 cm. in diameter was noted on the central forehead. General physical examination was negative. Laboratory findings revealed a leukocyte count of 8800 per c.mm., the differential count being normal; V.D.R.L. test was negative and urine normal.

Treatment with hydroxychloroquine sulfate (Plaquenil) 200 mg. daily for two months resulted in no improvement and was discontinued.



Fig. 4

DISCUSSION

Since the etiology of granuloma faciale is unknown, the findings over a 12-year period in the first patient have been reviewed. It is not known whether pulmonary sarcoidosis was related to the dermatosis in this patient, but this appears unlikely because, during the 12 years, the pulmonary changes became less marked whereas the skin lesions progressed. Radiographs of the thoracic cage, lumbar spine and pelvis showed no changes suggestive of eosinophilic granuloma of bone. Two abdominal calcified densities remained unexplained. A persistently high erythrocyte sedimentation rate was noted.

Clinically, granuloma faciale must be distinguished from disorders exhibiting single or multiple soft brownish-red papules and plaques limited to the face. These include lupus erythematosus, dermatitis actinica (polymorphous plaque type), lupus vulgaris, dermatitis medicamentosa (fixed type), granuloma annulare, erythema elevatum diutinum, benign lymphocytic infiltration, sarcoid, xanthoma, lymphoma, and basal cell carcinoma.

In all of these cases the biopsies were characterized by a histologic pattern that we feel is con-

firmatory of the clinical diagnosis of granuloma faciale. In all, there was a heavy inflammatory infiltrate situated in the upper two-thirds of the dermis, but separated from the epidermis by a narrow uninvolved "grenz" zone. In Cases 1 and 2 the infiltrate was a heavy admixture of neutrophilic polymorphs, lymphocytes and plasma cells with fairly numerous eosinophils and histiocytes. In Case 3 there was a similar distribution with the exception that neutrophilic polymorphs were scanty and lymphocytes numerous. The infiltrate could be identified as perivascular to some extent, but for the most part it was confluent and difficult to associate with blood vessels. In none of the cases was there any definite fibrinoid change in the perivascular connective tissue, and fibrosis was not observed.

Granuloma faciale is resistant to treatment. Persistence or recurrence of the plaques after excision, radium, and roentgen therapy, as observed in Case 1, has been noted in previous reports. McCarthy⁴ noted recurrence after use of unfiltered x-rays, electrocoagulation and excision with grafting. Gold, arsenic or bismuth therapy is ineffective.⁵

The etiology of this condition is unknown. In lesions occurring on the face, the effects of sunlight merit consideration. Johnson *et al.*³ reported that most of their patients had fair skin and blonde to brown hair and that the lesions of one patient treated by antimalarial drugs temporarily flattened.

The occupations and hobbies of our patients did not expose them to sunlight to any unusual degree. N.N. and J.K. were treated by antimalarial drugs with some subjective but no objective improvement.

SUMMARY

Three patients who exhibited the lesions of granuloma faciale are reported. This dermatosis is rare, benign, and not related to the reticulohistiocytoses or to any known systemic disorder; one patient had diffuse pulmonary fibrosis of undetermined etiology, possibly sarcoidosis. It is important to distinguish the entity from more serious disorders and from dermatoses which can be treated with success. In our patients, excision, radium, roentgen rays, intralesional injection of hydrocortisone acetate and antimalarial therapy were ineffective.

Thanks are due the Photographic Departments, Vancouver General Hospital and British Columbia Cancer Institute, for preparation of photographs.

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EARLY SIGNS OF IMPENDING BREAKDOWN IN FLIGHT PERSONNEL:

THE PRACTISING PHYSICIAN'S CONTRIBUTION TO COMMERCIAL FLYING SAFETY

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THE GENERAL practitioner of medicine, or the specialist in fields other than psychiatry, is usually the first one to see the patient threatened with an emotional breakdown. The psychiatrist ordinarily sees the patient only by referral from one of his medical colleagues seeking his help. Because of this recognized custom in the practice of medicine, it is all the more important that the non-psychiatric physician be alert and perceptive to those *early* signs indicative of an imminent breakdown.

Pilots, like anyone else, are subject to a host of emotional disorders, many of these having serious implications. Physicians who care for pilots thus have the responsibility of being aware of these human reactions of decompensation. They face a difficult task, that of being at one and the same time the private physician of the pilot, and indirectly the guardian of the safety of the flying public. As such they owe the pilot the protection inherent in their role as his physician, yet at the same time, the pilot could consider them a threat to his economic security. This is a plea for recognition on the part of the private physician of his real responsibilities for the safety of those who fly.

If a physician's relationship with pilots includes frequent contacts for "sick call", he is in a much better position to protect their emotional health than would be the case if he were responsible only for their annual comprehensive examinations.

To approach this matter in a practical way, let us first consider the problem of the physician who has pilots among his patients. Basically, it is his responsibility to identify emotional disorders in these flying personnel as early as possible, and then to do whatever is necessary in each particular case.

What sources of information are available concerning possible emotional illness in these patients who themselves have such a great responsibility to the public? First, there is the pilot himself. He may be seen by self-referral, by contact at sick call, or during regular physical examination. In this connection it is important to realize that one simply does not get the sort of information needed unless the examination is conducted with privacy and with an opportunity for thoughtful discussion between doctor and patient. It is of the utmost importance, therefore, that physicians who care for pilots take *sufficient time* to carry out a *simple*

psychiatric appraisal of the patient's mental health each time he is seen professionally.

A second source of information concerning the pilot's emotional health is his wife or family. It should not be considered at all ill-advised to ask the wife of a pilot, privately and in a dignified manner, how things are going within the family. Many a wife will appreciate this opportunity to share with the physician some of her concern about her husband.

Additional information may be forthcoming from other pilots or crewmen who are in a position to observe the attitudes and behaviour of the pilot at his daily work. Important information may be acquired from the casual comments or "asides" that pilots make concerning their fellows.

With these sources of information, what sort of findings should be looked for by the physician? Of course one is on the lookout for a history or diagnosis of any disorder which of itself is a cause for pilot disqualification. Among these are: (a) a disorder of character or behaviour which is sufficiently severe to have repeatedly manifested itself by overt acts, (b) a psychotic disorder, (c) chronic alcoholism, (d) drug addiction, (e) epilepsy, or (f) any disturbance of consciousness without satisfactory medical explanation of the cause.

But clinicians must look for more than this. They must search for the clues that might lead to such diagnoses. Dr. Frank Ayd¹ has grouped the symptoms of *depression* under three general headings, physical, emotional and mental. Among the physical findings, he has listed headache, a feeling of pressure in the head, dizziness, ringing of the ears, visual disturbances, tachycardia, dyspnea, constriction in the chest, anorexia, weight loss, upset digestion, nausea, constipation, diarrhea, urinary frequency and burning, decreased libido, partial impotence, itching, complexion changes, and urticaria. Under the emotional symptoms, he lists anxiety, tenseness, cancer-phobia, fear of impending insanity, obsessive thoughts, compulsive behaviour, guilt feelings, depressed moods, crying spells, a slowed walk, sluggish reactions, an appearance of dullness, lack of confidence, worry that something untoward is going to happen, and sleep disturbances. Under mental symptoms he includes psychomotor retardation, impaired concentration, impaired memory, indecisiveness, lack of interest, delusions over sinning, and a low opinion of oneself.

All these symptoms are important to the clinician and merit further elaboration. In addition to the foregoing disturbances one should be constantly on the lookout for changes in the pilot's behaviour, with or without suitable explanation; the sort of thing that leads his fellow pilot to say "Old George isn't acting like himself these days." Other important manifestations of impending breakdown include increased drinking; religiosity; changes in sleep pattern, either as an inability to go to sleep at night, or too early awakening; pessi-

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mism; reduction in emotional attachments to people, things or causes; increased irritability; hypochondriacal concern with personal health; unnecessary self-criticism or self-blame; fatigue without an obvious cause or substantiating laboratory findings; loss of appetite and weight; persistent headaches, diarrhea, constipation, blurring of vision, or any persistent somatic complaint without physical findings; difficulty in concentration or in thinking; marital conflicts; problems with offspring, and financial problems.

It is recognized that all of these symptoms are not necessarily individually significant. Some are much more important than others. Clinicians must evaluate the patient's symptoms and their own findings, and must be alert to any mental state that could lead to sudden destructive action on the part of the pilot or to such a degree of preoccupation as to present a hazard to the passengers in his plane. They must look for the onset of insidious depressions, for phobic reactions, for any delusional thinking, for severe anxiety reactions, or conversion reactions with impairment of senses, and for any sociopathic behaviour. Particularly, they must be vigilant for anything that would reduce ego function.

What should be done if one suspects the presence of an important emotional disorder in a pilot? Certainly any doctor would evaluate this patient carefully. During this evaluation, the patient should be put at ease. One should attempt to make sufficient time available, because the examination of this pilot is, or should be, the subject of foremost importance at that particular time. Later, one should seek tactfully to obtain additional information from his family, his associates, and his friends. If there are doubts about one's own ability to make a decision in any individual case, one should arrange consultations with other physicians, including a psychiatrist, if indicated.

When a physician has established the fact that there is possibly a serious emotional disorder present, the pilot's family must be informed, and the patient given the opportunity to seek private treatment. It is obligatory that he be "grounded" or placed on the sick list, and kept there for as long as the consultant and family physician agree is necessary. Particularly is this true if the pilot is taking any medication which might limit his perceptive powers or decrease his inherent ability to fly safely. If and when he recovers he should be returned to his job and his full professional status and seniority. If he does not get well, retirement proceedings should be instituted.

This matter of emotional disorders in pilots may not be a major problem statistically, because pilots are, as a rule, a highly selected group of professional people. But even one fatal accident from such a cause is one too many. It is an important facet of the airline medical director's job to keep informed regarding the emotional status of his

pilots. This implies that he must function as an air group flight surgeon would function, and he should be as personally familiar with his pilots as possible. He must be receptive to any information concerning the emotional health of his charges. He must act in the best interests of the pilot, the public and his company, and be constantly mindful of the dangers these unfortunate human decompositions pose. He must be able to depend on the private practitioner of medicine to help him in his responsibilities to the flying public. It is not only in the area of emotional disorders that the airline medical officer appreciates the help of the private physician. In his dedication to safe operation of aeroplanes, the medical director welcomes any medical information pertinent to the safety of his expensively trained and invaluable professional colleagues who fly planes and have the responsibility for the safety of the flying public.

The following examples from our military experience emphasize the vital importance of the early detection of impending breakdown in pilots.

CASE 1.—A young lieutenant, known by his associates to have a history of rather erratic flying and frequent job changes, had long been considered a relatively unsafe pilot by his fellow flyers. Recently, one afternoon he returned a number of borrowed books and other articles to the owners, paid his bills and straightened up his room. There was minor concern on the part of his room mate and a doctor friend as to the significance of this behaviour, but neither did anything about it. Next day this pilot borrowed a plane, went out to the small field to which he was assigned, did some flagrant "flathatting", and then, making a 50-foot pass across the field, pulled the plane straight up and climbed it to around 2000 feet, where it stalled. The plane came down to a crashing explosion. While this case is still under investigation, it illustrates dramatically that something must be done by someone when indications of emotional disturbance are present.

CASE 2.—A lieutenant commander talked to his senior medical officer on a Friday regarding his serious sleep disturbances and depressed feelings. The medical officer planned an emergency appointment on Monday morning with the psychiatrist. The patient committed suicide on Saturday morning.

CASE 3.—A young pilot on the West Coast, anticipating an early deployment, went into an acute panic reaction when his wife left to return to her home in Florida. He was able to contact her by having her paged at the Union Station in Los Angeles, and pleaded with her not to leave him. He could not tolerate being without her. She sought the flight surgeon's help, and the patient was admitted to hospital. He was transferred to the Naval Aviation Medical Center at Pensacola as a patient, and was treated for two months in the hospital and for three months as an outpatient in the psychiatric clinic. He has now recovered his emotional composure, is back to duty in a non-flying status and is doing quite well.

CASE 4.—A relatively senior Marine pilot was urged by his friends to seek help because of his increased drinking. It became apparent in the psychiatric clinic that a marital problem was an important factor in his drinking habits. One psychiatrist worked with this patient and another with the wife, and the marital conflict was resolved in a mutually satisfactory manner. The patient reduced his binge-type drinking to ordinary social drinking and is functioning well as a transport pilot.

CASE 5.—An ex-enlisted man, a lieutenant, became depressed over his chances for promotion to lieutenant commander. The depression reached moderately serious proportions and his family urged him to see a private psychiatrist. This physician unfortunately overlooked the military significance of the situation and gave the patient electroshock therapy daily for one week. He then discharged him to resume his Navy duties. The patient attempted to carry out his duty as an instructor the following week, but the memory loss resulting from the shock treatment almost panicked him. His student reported him to the squadron commander, who sent him to the flight surgeon. He was treated as an outpatient in the psychiatric clinic until his depression lifted and the amnesia receded. He continued on active duty, but in a non-flying capacity.

CASE 6.—A 33-year-old lieutenant commander had his first epileptic seizure while mowing the grass at his home. Frightened by this, but more frightened by the possibility of losing his job, he did not report it to anyone. A few days later he had his second epileptic seizure while instructing a primary student in flight. While circling at 500 feet in the landing pattern the patient suffered a convulsion. This did not cause him to disturb the controls, and the student was not aware of the occurrence, but when the patient regained consciousness he was several miles away from his landing field, and realized for the first time what had happened to him. He reported on his own initiative. Investigation revealed no organic cause of his seizures, but the patient was eventually retired from the service because of increasing severe epilepsy, which has continued to date.

The military services in which many civilian physicians have served have established good medical policies for our guidance in commercial aviation. The flight surgeon's job is to keep his men flying so long as they are able and safe, but he must also ground them as soon as any doubt enters his mind concerning their safety. To be able to do this, he has to know his pilots more intimately than the average physician knows his patients, because they are engaged in a hazardous occupation. It might be appropriate to mention how thoroughly our current Naval Flight Surgeons are being trained in psychiatry. At the Naval School of Aviation Medicine in Pensacola, Florida, each student attends a 45-hour graduate-level lecture course in psychiatry and spends a further 30 hours in the psychiatric clinic. In addition, he gains "on the job experience" by standing regular medical watches at outlying air fields. He is thus able to discuss by telephone any problem case he encoun-

ters and has the privilege of immediate referral of any patient to the psychiatric clinic. Such close contact with consultants is of great value both to the student flight surgeon and to the already designated flight surgeon, and emphasizes to him the degree of importance which the Navy attaches to the emotional health of aviation personnel.

So, too, each physician must be concerned with the emotional health of his patients who are pilots. In a sense each is practising a very important type of psychiatry. Each physician must evaluate the whole man and his reaction to the totality of his environment. Certainly physicians are sufficiently mature to realize that the basic emotional problems encountered in such men are not exclusively sexual in origin, nor can one place all the blame on these patients' mothers or their own childhoods for the conflicts affecting their lives. This point was clarified in a recent paper by Terhune.² The patient's problems are usually manifestations of anger, fear, ignorance or selfishness.

When a physician takes the Oath of Hippocrates, he states: "Whatsoever in my practice or not in my practice I shall see or hear amid the lives of men which ought not to be noised abroad, as to this, I will keep silence, holding such things unfitting to be spoken." Surely an aeroplane pilot can have his hemorrhoids treated or his sprained ankle taped without requiring his private physician to report this in detail to the medical director of the airline. But when a practitioner suspects that an emotional disorder is lurking behind a somatic disguise or identifies a frank neurosis, or finally recognizes a pathological personality pattern, what should he do? He is morally obligated to inform the responsible member of his patient's family. Should he then report his findings to the medical director of the airline for which his patient flies? Should he report his opinion in case the family refuses consent for him to do so? Is the airline medical director entitled to this information? Can the public rightfully expect the medical director of the airline to be responsible for the physical and emotional health of the airline pilots? Or, does the silence imposed by the Oath of Hippocrates force the private practitioner to disregard the public's interest in the health and safe flying ability of airline pilots? The Oath states that one should keep silence about that which should *not* be noised abroad. It is the author's opinion that a private physician who is treating an airline pilot with an emotional disorder has knowledge which should be "noised abroad" to the medical director of the company and to the patient's family. While this question involves the pilot's rights to privacy, his life, health, job security and the economic welfare of his family, it also directly involves the safety of the flying public. The questions of medical ethics and public safety are thus intimately and importantly interwoven in this question. It may be necessary for national medical and psychiatric associations, the Airline Pilots Association, the passenger-

carrying airlines and representatives of the flying public to conduct co-ordinated discussions and arrive at a mutually satisfactory understanding concerning these matters.

It is the author's personal view as a psychiatrist that an emotionally disturbed pilot is entitled to careful and conscientious evaluation and treatment in a safe environment, and that the flying public is entitled to have emotionally healthy and safe

pilots flying for the commercial airlines. It is thus up to all of us who serve these pilots as physicians to fulfill our basic role in the preservation of health and safety to the utmost of our ability.

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THE USE OF THIORIDAZINE (MELLARIL) IN AGED PEOPLE*

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THE NEUROPHYSIOLOGICAL and biochemical mechanisms underlying the tranquillizing action of certain phenothiazine derivatives and other psychotropic drugs are poorly understood.¹ Empirically, however, these drugs have proved their usefulness not only in psychiatry but in other branches of medicine as well. Unfortunately, practically all of the psychotropic drugs can cause undesirable and even serious side effects, some of which seem to be related to the psychotropic potency of the drug,² whereas others seem to depend on the dosage applied or a specific sensitivity of the patient to a given drug. In general, the incidence and type of side effects are of no less concern to the clinician who investigates and uses a new psychotropic agent than its mode of action and psychotropic potency. This is particularly important when dealing with certain groups of patients such as children and the aged. With the older age group, the possible side effects of the phenothiazine derivatives on the extrapyramidal apparatus, the liver and the cardiovascular system have to be carefully considered. It is, therefore, understandable that psychiatrists working with aged people welcome and are ready to investigate any psychotropic drug which promises to produce the desired effect without at the same time causing harmful side reactions, even in long-term application.

It is the purpose of this paper to report on a long-term study of the effect of a relatively new tranquillizing drug, thioridazine (Mellaril), on a group of patients suffering from mental disorders of the senium.

Thioridazine is a phenothiazine derivative, the chemical and pharmacological properties of which were investigated by Bourquin and co-workers³ and Taeschler and Cerletti.⁴ These studies showed that thioridazine has an anticholinergic and an adrenergic blocking action, but only an insignificant antiemetic and hypothermic effect.

The clinical effect of thioridazine was studied by Remy,⁵ Cohen,⁶ Fleeson and co-workers,⁷ Kinross-Wright,⁸ Azima and co-workers⁹ and Turski.¹⁰ It would appear from these studies that its tranquillizing effect is comparable to that of chlorpromazine and promazine and that it is practically free of side effects, particularly as regards extrapyramidal and liver complications. It was this latter fact which prompted the use of thioridazine in geriatric patients.

CASE MATERIAL AND METHOD

The case material for this study was drawn from the population of an old people's home described previously.¹¹ This population consists of about 160 senescent people of the Jewish faith and mostly eastern European origin who came to Canada at the beginning of the century. About 60% of the population are women, 40% are men. Their average age is 79 years. About two-fifths of them are well preserved, in the psychiatric sense. They are able to look after their personal needs, they are orientated in the three fields, and judgment and emotional reactions are preserved. Their memory function is either unimpaired or they show only the type of senescent memory dysfunction previously described as "mild".¹² About one-fifth of them have a definite history or signs of functional psychosis but do not suffer from psychoses due to organic brain disease. The remaining two-fifths are suffering from organic psychoses but can be kept in the Home thanks to modern treatment methods, particularly the new drug treatment.

TABLE I.—CASE MATERIAL ACCORDING TO SEX AND AGE

	Number	Age range	Mean age
Women.....	27	67 - 92	80.1
Men.....	10	67 - 90	82.6
Total.....	37	67 - 92	80.8

The group under study comprised 37 residents, 27 women and 10 men. The age range of the group was 67-92, with a mean age of 80.8 years. The age range of the women was 67-92, with a mean age of 80.1, and that of the men 67-90, with a mean age of 82.6 (Table I).

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Thioridazine was given only to those residents who were in need of a tranquillizer, according to accepted psychiatric standards. Table II shows the composition of our group according to diagnostic categories. Twelve patients were suffering from senile psychoses, 14 from cerebral arteriosclerosis with psychotic manifestations and 11 from functional psychoses (7 with depression, 2 with a manic phase of manic depressive illness and 2 with late paraphrenia). Our case material does not comprise any "well-preserved" residents in the sense of our previous study.¹¹ It comprises, however, the main categories of psychoses of the senium which Roth¹³ observed and described in his studies. It should be mentioned that the severity of the psychotic conditions in our group was naturally less than that usually seen in mental hospital patients.

TABLE II.—DIAGNOSTIC DISTRIBUTION

Diagnosis	Women	Men	Total
Senile psychosis.....	8	4	12
Cerebral arteriosclerosis...	10	4	14
Functional psychosis.....	9	2	11
Total.....	27	10	37

This, with certain precautions which we considered necessary with regard to the advanced age of our patients, accounts for the relatively low dosage of thioridazine applied. The drug was given in the form of coated tablets of 10 or 25 mg. The daily dosage ranged from 20 mg. to 200 mg. The average dose was 70 mg. The total dosage ranged from 600 mg. to 41.4 g., averaging 13.6 g. The duration of treatment ranged from 9 to 439 days, averaging 217 days.

During this time the patients also received other medication, such as insulin, digitalis, antibiotics and soporifics when this was deemed necessary by the medical staff. All patients also received vitamin B but none were given any other tranquillizer including Rauwolfia derivatives. All patients were seen regularly and examined by the medical staff of the Home, particularly regarding neurological status, cardiovascular system, and possible hepatotoxic effects of the drug.

RESULTS

The tranquillizing effect of thioridazine, when it occurred, made itself felt within 24 hours after commencement of treatment even when the dosage was small. The patient would lose his restlessness and agitation, usually without becoming drowsy or sleepy. The process of thought was not interfered with by the drug. In those with confusion of thought before treatment, as in some patients with senile psychosis or in an acute confusional state after a stroke, this condition was not aggravated but rather improved by thioridazine, probably owing to decreased restlessness and agitation.

No depressive effect on the patients' mood was noted. However, in a manic patient, the drug in a dosage of 200 mg. per day decreased not only the degree of overactivity but also the manic euphoria. On the other hand, thioridazine alone did not improve the depressive mood of patients suffering from a depressive condition.

SIDE EFFECTS

As far as the physical condition was concerned, in the doses used, there were no changes in the neurological status. The drug did not produce a parkinsonian syndrome or acathisia or other extrapyramidal hyperkinesia. Two patients with arteriosclerotic parkinsonism did not show an increase in their neurological signs. However, some patients when started on a dosage of 25 mg. 3 to 4 times a day, occasionally fell, although they stated that they did not feel dizzy. The systolic blood pressure on such occasions had fallen by 20 to 30 mm. Hg. This complication ceased when the dosage was reduced. Some patients complained of drowsiness without falling, and this complication also subsided upon reduction of dosage. Another interesting observation could be made at the end of the study period, when thioridazine was discontinued and replaced by the same dosage of chlorpromazine. The nursing staff reported that the patients became drowsy and sleepy; some could hardly be aroused for feeding and toileting. When they were given thioridazine again, the desired tranquillizing effect was obtained without making the patient sleepy. It is also worth mentioning that no case of jaundice or agranulocytosis was encountered.

The results achieved were graded quantitatively into three categories: good, moderate and negative. A "good" result was believed to be achieved when the previously restless and agitated patient became quiet and able to participate, as far as his physical condition would permit, in the usual activities of the Home, such as group meetings, occupational therapy, or religious services. A "moderate" result was registered when the patient became manageable and co-operative with the ward routine but would not participate in group activities. A "negative" result was registered when the patient did not show any improvement after a reasonable period of thioridazine treatment, or when the drug had to be discontinued because of the patient's refusal to take it. In such cases we had to revert to intramuscular injections of chlorpromazine or promazine.

Table III shows that the drug was effective in 29 of 37 cases. In 18 the result was registered as "good" and in 11 as "moderate"; a "negative" result was noted in 8. In other words, about 75% of the patients benefited by the treatment. Statistical analysis revealed that there was no significant difference in the treatment results in regard to sex.

TABLE III.—RESULTS OF TREATMENT

Diagnosis	++	+	—	Total
Senile psychosis.....	7	3	2	12
Cerebral arteriosclerosis....	4	6	4	14
Functional psychosis..	7	2	2	11
Total.....	18	11	8	37

Table III also shows that the over-all benefit, comprising both "good" and "moderate" results, was fairly equally distributed between the three diagnostic categories. A "good" effect was noted in 7 of 12 senile, and 7 of 11 functional psychoses (58.3% and 63.6% respectively) but in only 4 of 14 psychoses with cerebral arteriosclerosis (28.5%). Further observations on a larger series will be required to show whether this difference is more than accidental. In general, it appeared that with the moderate dosage applied, the degree of improvement depended on the severity of the clinical condition. A brief remark seems to be in order regarding the group of functional psychoses. In the two patients with paraphrenia and the two manic patients thioridazine was given as the only psychotropic agent. In the 7 patients with agitated depression, thioridazine was given together with imipramine (Tofranil) to combat agitation. The result of this combined treatment was considered beneficial in 6 of 7 cases.

DISCUSSION

It has been mentioned above that the incidence and the type of side effects of any new tranquilizing drug must be of the same concern to the practising psychiatrist as its mode of action and potency. Our observations with thioridazine have shown that, at least in the dosage applied, side effects of note were lacking. In the beginning of the study there was occasional "falling" associated with a drop in the systolic blood pressure. However, this complication ceased when the dose was reduced.

The dosages were admittedly small and it is quite possible and even probable that greater tranquillization might have been achieved if the dosage had been increased. However, because of the side

effect of "falling" and also because the patients were from an old people's home and were not severely psychotic, it was not thought advisable to increase the daily dosage. This made it possible to continue the medication over many months without serious side effects.*

Although we agree with Azima and co-workers⁹ that thioridazine does not represent a novel principle in the group of the tranquillizing psychotropic drugs, its effect in the dosage applied was satisfactory for the intended purpose.

SUMMARY

A report is presented on the effect of the long-term treatment with thioridazine (Mellaril) of 37 senescent people suffering from various types of mental disorders. The daily dosage averaged 70 mg. and the duration of treatment 217 days; 75% of the patients benefited by this treatment. Serious side effects were lacking. The drug seems suited for the treatment of mental disorders of the older age group, provided that the dosage is kept moderate and proper controls are applied.

ADDENDUM

*Since this report was written, an article by Weekley and co-workers¹⁴ appeared. These authors observed pigmentary retinopathies of a serious nature after high daily doses of thioridazine (4000 mg.). They stated that daily doses of 2000 mg. and more might lead to this complication.

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PAGES OUT OF THE PAST: FROM THE JOURNAL OF FIFTY YEARS AGO

A meeting of the Toronto Academy of Medicine was held December 6, 1910, in the biological department of the University of Toronto, Dr. A. A. Macdonald, president, being in the chair. The meeting was devoted to a series of papers on the subject of immunity. Professor J. J. Mackenzie dwelt on the general aspects of the topic, and first considered briefly the development of immunity from the fundamentals originated by Pasteur and Koch. The rise of the cellular and humoral ideas, and their development and expansion were also considered, recent theories were reviewed, and the progress of the past five years was touched upon. The work on anaphylaxis was concisely presented, stress being laid on the possible relationship between anaphylaxis and immunity, as suggested in the more recent work of Friedberger, Sleswijk, Loeffler and

others. Landsteiner's suggestion as to the role of lipoids in various immunity reactions was, according to the speaker, a most suggestive recent contribution to the subject, and one likely to lead to fruitful results, as experimental work develops.

Professor Amyot reviewed the rise of the practical use of the theoretical considerations in this field, as exemplified in the preparation of vaccines, bacterial vaccines, antisera and antitoxins. The advances in modern serum therapy and the practical advantages of being able to confer passive immunity were dwelt upon.

Dr. Caulfeild's paper, the third on the program, was on the subject of the application of immunity to clinical medicine.—*Canadian Medical Association Journal*, 1: 96, January 1911.

MEDICAL ECONOMICS

HEALTH INSURANCE AND COMPREHENSIVE MEDICINE

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INSURANCE FOR medical services, with some measure of control by the various provinces in Canada, is inevitable.

In a recent letter to the editor of this Journal (*Canad. M. A. J.*, 83: 331, 1960) Dr. J. H. MacDermot mentions the prevailing anxiety about the future of medicine in Canada. This of course was brought to the attention of everyone by the recent election in Saskatchewan. The author agrees with the general theme of Dr. MacDermot's letter that we as a profession must negotiate with the government with understanding, sympathy and tolerance. However, we still have considerable cause for anxiety. We are experiencing a revolution in methods of delivery of medical care and we are not prepared for it. We cannot help but ask why this difficulty between government and profession should exist. Why should the effect of statism in medicine create near panic in our thinking? It is surely a paradox, in this age when medical science has contributed so much to the welfare of humanity, that we as a profession are not trusted to lead and advise government in what is generally considered not only necessary but obligatory.

In the same letter Dr. MacDermot submits that we already have a plan to cover medical services. He is referring to the existing voluntary prepayment plans. But herein lies our difficulty, in that we are putting the cart before the horse. Economics should and could be worked out when we are certain that an adequate service can be delivered. The author would like to submit the thesis that we are failing in the delivery of a comprehensive medical service and to discuss the reasons why such service is inadequate. In the development of any health insurance plan now in existence in the Western world (with the possible exception of that in Australia) the comprehensive nature of medical service has not been adequately considered.

During the past century, chiefly because of the many important advances made by medical science, both the medical profession and government have thought in terms of hospital and consultant medicine and have overlooked certain primary essentials that are extremely important to the average patient. The politicians are not dull. They have looked into the minds and hearts of their voters, who have revealed to them the inadequacies of medical service as they see them.

Let us endeavour to understand this. Those of us who have studied the effects of Britain's Na-

tional Health Service, who have followed the reports thereon in the literature, and who have visited Britain on one or more occasions, have arrived at certain conclusions. In the writer's view, the National Health Service of Bevan was a masterpiece of government planning. It succeeded in making a great contribution in hospital and consultant services across the nation; it raised the standards of these services almost to that of the university hospital level. In its basic general practitioner service however, except in certain instances where the personality of the practitioner overcame the inadequacies, it has been a sad, sad story. It is failing to deliver the essentials, which will be discussed later. It has divided the profession into two parts as by an iron curtain. But if the College of General Practitioners had been in existence for a period of time sufficient for it to establish its prestige and to make its contribution as a consultant body alongside the Royal Colleges, many of these errors could have been avoided. We are in the same danger in Canada unless we have the breadth of vision inherent in the concept of comprehensive medicine.

However, in contemplating this revolution that is taking place in the delivery of medical care, and that has now arrived in Canada, we may underestimate the profound effect that statism in medicine, especially in Britain, is having upon our thinking in this country.

What, then, are some of the essentials of any comprehensive medical service?

AVAILABILITY

Illness and accident have no respect for time, nor in the emergency is there much honour given to scientific prestige. When, in the family, an acute coronary occlusion occurs, when a hemorrhage complicates the last trimester of pregnancy, or when a child falls under a tractor, it is availability of medical service that is most important in the lay mind. Anticoagulants, blood transfusions, radiological facilities and antibiotics we must provide, but *we* must also be available. These examples can be multiplied many times. In all communities in Canada, but especially in the larger ones, it is extremely difficult to obtain a doctor when he is needed by the average citizen. Our valuable scientific benefits are difficult to obtain because our basic medical service supplied by the general practitioner is inadequate.

CONTINUITY

This is not intended as a reactionary appeal for the return of the day of the "horse and buggy" doctor. But when every family had a doctor who was not only their physician but guide and coun-

seller from conception to the grave, continuity of medical care was not a problem. In each illness and accident this doctor was their manager from the beginning of the emergency to the completion of rehabilitation. Today, not only are such basic physicians in short supply, but the medical profession, like the rest of society, is moving towards greater specialization. Also the lay public are groping among many specialists for the best in technology. The patient is sent by the practitioner to outpatient department or clinic without the benefit of the practitioner's services. He is passed from department to department, receives the ultimate in technology and is then sent home without plans for continuity of medical care or rehabilitation. But this is not all. The patient and family need an anchor which modern medicine has taken from them. With a system of planned health insurance this problem can only worsen.

THE PROMOTION OF HEALTH AND PREVENTION OF DISEASE

Much has been written and a great deal accomplished in this broad field. Unfortunately, we have failed to co-ordinate our efforts in a comprehensive manner.

Public health programs dealing with the prevention of epidemics, sanitation and hygiene have a long history of meritorious accomplishment. Many aspects of health education, not only in the schools but also on an adult level, have been partly handled by the state and partly by private medicine in a very inefficient manner. There is, however, a much larger field in which we have been very deficient. How frequently does the physician hear the request, "Doctor, I want a check-up." The patient is seeking for means of promotion of health and prevention of disease. This should be a challenge to us in any form of health insurance. The basic physician is the one who will most often hear this request. He needs a broad diagnostic training, the resources of laboratory and auxiliary personnel and easy access to a large number of specialists.

THE HUMANITARIAN OUTLOOK

How glibly we pay lip service to this essential—the humanitarian outlook. How easily it is lost in this world of technology. It is closely allied to availability and continuity of medical care and preventive medicine programs.

Bevan tried hard to build these essentials into his National Health Service plan. In some measure he succeeded, but in large part he failed. This humanitarian spirit is present in every physician who has taken the Hippocratic oath, but in this day of technology when the patient passes from department to department and is seen by a multitude of personnel, the humanitarian outlook is difficult to maintain. As we contemplate health insurance we should consider how at least part of this difficulty can be overcome.

If it is agreed that the aforementioned features are of fundamental importance in any comprehensive medical care service, we not only must ask why they have not been maintained under our present system, but we should also inquire how they can be linked with and added to the practice of modern scientific medicine.

If we study all the plans of health insurance from the first one established in Germany in 1883, we will discover certain truths. The first is that any plan must have a basic general practitioner service. Secondly, in all existing plans (with the possible exception of that in Australia) quality of the basic service has been replaced by quantity. Since this part of the service is mandatory, since the primary essentials are so intimately connected with it, since quality and unity within the whole profession are necessary, surely we must search for ways to correct existing inadequacies before negotiation with government. When Premier Douglas stated, "The only change is that the doctor will send his account to the government instead of the patient," it surely revealed the inadequacy of his consultant advice from those who do not understand the importance of comprehensive medicine. The question of adequacy of the basic medical care services and the unity of all parts of the profession in the delivery of these services has never been thoroughly considered in the planning of any form of health insurance.

REASONS FOR INADEQUACIES

The reasons for such inadequacies may be considered in two categories:

(1) *Those associated with the individual physician.*—These refer to the disciplines through which he delivers the essentials of his service, ability, training, skill and energy. These factors are associated with his personality and his ability to co-operate with others in a team approach. If we are to negotiate with government, it seems evident then that we must control the quality of medical professional services. In this connection we might well take a leaf from the book of the American College of Surgeons which, since 1913, has controlled the quality of service by its members and has elevated its standards throughout the United States and Canada. We will never submit to a bureaucratic police control by the state, but we can and ultimately will voluntarily control the quality of medical care by some form of medical audit of the practice of basic physicians in hospital, home and office.

Of importance among the factors which are under the control of the physician himself is the manner in which his services are delivered. The profession should accept the fact that the solo physician belongs to the past. The modern, general, basic physician not only needs a new outlook on education and training but also needs the help of a large number of specialists, auxiliary personnel and equipment. This requires team work, and group

practice in medical centres will ultimately provide the answer here.

It is interesting to note that Bevan's National Health Service visualized the development of such medical centres. Very few did develop, and one wonders why. Again it would seem to be a case of lack of leadership on the part of the profession who did not appreciate the importance of a comprehensive medical service. In 1944 the late Professor Sigerist, in speaking to the Voluntary Committee on Health of the Canadian Senate and House of Commons, made the following statement: "My own personal view is that, in the future, medicine will increasingly be group medicine practised through medical centres, for the simple reason that this is the form of medical care that can make the best use of the present technology of medicine."

In North America there are many examples of this type of practice, and much information is available concerning group medicine. It has generally been successful and popular. It tends to have one serious failing in that the centres become referral clinics with interest only in specialized medicine. With a new educational outlook and increased prestige for the basic physician and the eventual creation of multiple centres, this discrepancy should disappear and we should then be able to deliver the essentials of comprehensive medical care as well as services of high scientific quality.

(2) *Factors associated with tradition.*—The factors associated with tradition are very deep rooted and will be difficult to change. Over these the individual physician has little or no control. They have developed largely because of a traditional educational pattern. This pattern, ideal though it may be, has resulted in lack of unity. Just before the turn of this century a new pattern of medical education, undergraduate and graduate, was evolved. It was led to a large extent by our own Sir William Osler. Departments of "precision-in-depth" of medicine were set up in pathology, medicine, surgery, obstetrics and gynecology. This was the beginning, and from it has grown a vast and valuable structure. From this have evolved major advances, not only in specialized medicine but also in research. Many other influences have made their contributions. The Royal Colleges of Britain, the pioneer work of the American College of Surgeons to be followed by the American Boards and many specialized societies, our own Royal College of Physicians and Surgeons, have all played their part in developing the efficiency of precision medicine from which the world has reaped untold benefits.

Nevertheless there is another side to the coin. The pattern of medical education, undergraduate and graduate, has overshadowed the need of a similar development for basic physicians to supply those needs of comprehensive medical care which are essential in any form of health insurance. We need another giant like Osler to add this to our educational pattern. Some progress has been made. A renaissance in medical school teaching has made

its appearance in undergraduate education. The American Medical Association has requested each of the 80 medical schools to organize and approve "all teaching techniques which give the medical student an experience in the general practice of medicine". Many evidences of this trend could be cited. Outstanding among these are the developments introduced by Scott in the medical school program in Edinburgh. There are many similar developments in various American universities, and one in Canada is under the leadership of a pupil of Scott, Professor Alexander Robertson of the University of Saskatchewan. The principle in all these developments is a broad exposure of the student to the fundamentals of basic medicine so that the future physician, general or specialized, may appreciate the importance of these principles.

In the field of postgraduate training there is need for broader vision. In the United States in 1959, for every 98 resident physicians training to be specialists only two were training in basic medicine. In Canada, Dr. E. Kirk Lyon reported that in 1959 there were 830 graduates from medical schools, while in the same year, 1013 physicians presented themselves before the Royal College of Physicians and Surgeons of Canada for examination in one of the specialties. This surely indicates the extent of the trend towards specialization and the need for a new outlook in training programs if the challenge of health insurance is to be met.

To provide this new outlook, several of our own leaders, including Professor Robertson and Dr. W. V. Johnston, have proposed the creation of "specialists in general practice", a concept which at first glance appears contradictory. Let us examine this proposal critically. In recent years, because of public demand, because of the insufficient training of many practitioners, and because of a shortage of basic physicians, family practice has been largely cared for by specialists in internal medicine. These individuals are trained as cardiologists, neurologists and gastroenterologists and in other subspecialties of internal medicine. They are interested in their chosen field and are not adequately equipped to deliver the essentials of comprehensive medicine. The specialist in basic medicine of the future should have equally prolonged, or even more intensive, training to that of his associates in the narrow subspecialties of internal medicine. He would become the modern basic physician who would play such a key role in the team effort of group practice. He would care for the majority of basic medical problems and deliver the essentials of comprehensive medicine. He would in addition be a link which could unite the profession and cure the currently vexing problem of hospital appointments. In a similar vein of thought, there is a need for a general practitioner who is a specialist in obstetrics and neonatal pediatrics. This is a concept not too different from that which led to the development of the Royal College of Obstetrics and Gynaecology of Britain. Finally, there is a need for

a general surgeon with wide experience. This well-trained man would provide efficient care for problems of minor, traumatic and emergency surgery in the multitude of centres that cannot support specialists in all of the narrower subspecialties of surgery.

SUMMARY

A successful program of comprehensive health insurance cannot be provided without a sound basic medical service. The development of such a service requires a new outlook in undergraduate and postgraduate training of the basic physician. As the pattern of specialized medicine was developed in the field of

education, so the leadership in this new outlook must be educational. Adoption of these concepts of medical education and practice will provide for a united profession which, in conjunction with the economists of organized medicine, will be in a sound position to negotiate with government.

In this changing and troublesome world scientific medicine has made and is making remarkable progress in the healing of the sick. Through the long pages of history we have maintained a revered and preferred position because of our integrity, humanitarian outlook and intimate association with people. This will be continued with unity and sympathetic understanding.

MEDICO-LEGAL

MEDICAL MALPRACTICE LITIGATION—THE DOCTORS' DILEMMA*

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PART II OF FIVE PARTS

THE LEGAL BASIS OF MEDICAL MALPRACTICE LIABILITY (CONTINUED)

The Application of the General Legal Principles

AS HAS BEEN stated earlier in this discussion, the law relating to malpractice is "... a special part of the general law of negligence applicable to those who undertake to treat the sick and injured". Having set forth the general principles of the law of negligence, one may proceed to examine their application to the question of malpractice liability. Any action for malpractice, to be successful, must on analysis be reducible to four basic elements, namely, (1) a duty of care owing by the defendant to the plaintiff, (2) a breach of this duty, (3) injury or damage to the plaintiff, and (4) direct causal relationship between the breach of duty and the patient's injury or damage. These four elements may be restated as the following equation:²³

$$\begin{aligned} &\text{Duty} + \text{Dereliction} + \text{Damage} + \\ &\quad \text{Direct Causation} \\ &= \text{Liability} \end{aligned}$$

The "four D's" constitute the minimal legal components of all actions for malpractice and the proof of each is indispensable to the plaintiff's case. For example, if the plaintiff proves that the doctor

acted with lack of care and skill but cannot prove the existence of a duty owing by the doctor, the action fails. Again, if the plaintiff proves the duty but cannot prove that the doctor acted with fault, the action fails. It follows, therefore, that by application of the equation stated to any allegation of malpractice, a ready estimation of the legal sufficiency of such an allegation can be determined. Duty and dereliction are two closely related subjects and will be dealt with at length in the discussion to follow. The subjects of damages and direct causation are fields of law in themselves and are more interesting to the lawyer than informative to the physician. Therefore, they will not be discussed.

It is a principle of law that a physician owes a duty of care to his patient, i.e. a duty to exercise a certain degree of skill and care in the rendering of his services to avoid injury to the patient. The primary question which begs answer in any question of medical malpractice is whether or not a duty of care existed in the circumstances. What are the legal origins of this duty? When does it arise? As stated earlier, the doctor's duty to his patient has a legal origin in both the law of contract and the law of tort. This means that the duty arises because (a) a contractual relationship exists between the doctor and patient, and (b) the law of tort imposes the duty upon the doctor. It is important to realize that these dual origins of the doctor's duty coexist. However, as will be seen, it is the duty as defined by the law of tort which is more important to the discussion of malpractice liability because the doctor's tortious duty exists as a matter of law apart from contractual relationships.

The contractual basis of the duty is not a legal document drawn up between doctor and patient, although such an agreement is not inconceivable. On the contrary, in the usual if not invariable

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course of events, an implied agreement for services arises between doctor and patient, and this implied agreement contains all the legal elements of any binding contract.²⁴ Therefore, when a patient summons his physician, he agrees by implication to follow the reasonable instructions his physician gives and to pay a fair fee for the services rendered. For his part, the doctor accepts this offer of employment and impliedly promises to render his services diligently and warrants that he possesses average knowledge, judgment, care, and skill. Therefore, by the mere establishment of the doctor-patient relationship, a doctor-patient contract is implied by law and the physician's duty is born with this contract. Although the principal basis of the physician's duty arises in the law of tort and exists apart from contractual relationship, there are instances when it is material to determine whether a contract between doctor and patient existed. For example, the doctor may refuse arbitrarily to accept the patient's offer of employment and since in such circumstances no contract arises, no duty arises, and hence no liability.²⁴ The moral aspects of this rule of law may be open to argument but the law refuses to impose upon the doctor his choice of patient. Again, the doctor may, by the terms of a contract, assume a higher duty than the law ordinarily demands, or he may seek to limit the duty imposed upon him by law.²⁵ However, these instances in which the duty is sought in contract are not common and not even likely to arise.

The fundamental origin of the physician's duty is the law of tort. This duty springs from the assumption by the physician of the care of the patient and the establishment of the physician-patient relationship.^{24, 26} It flows from the general principle of tort law that:

"One who enters on the doing of anything attended with risk to the persons or property of others is held answerable for the use of a certain measure of caution to guard against that risk."²⁷

This applies not alone to doctors, but to anyone who enters on the doing of anything attended with risk to others and it is the entering on the act which gives rise to the duty.

The law of torts imposes no duty upon a person to act toward a stranger and if he chooses not to act no liability follows upon this choice. However, from the moment he elects to act toward that stranger a legal duty impinges upon him to minister to that stranger in such a manner as to avoid unreasonable risk of damage. In the case of a doctor, this legal duty arises from the moment the doctor by his act undertakes to treat the patient and establishes the doctor-patient relationship, and it continues until this relationship is properly terminated. Although in most instances the doctor-patient relationship is established by contract, it is important to realize that the doctor's duty arises and exists independently of any agreement between

doctor and patient. This principle was declared by Sir Edward Coke in the case of *Everard v. Hopkins*, when he stated that a servant had a right to sue a negligent doctor although the master hired the doctor to treat the servant.⁸ While no contractual relationship existed between the doctor and the servant, the law imposed a duty of care upon the doctor toward the servant. Similarly, a husband may contract with a doctor for services to his wife, or a father for his child, but the patient in each case is still the object of a duty of care from the doctor. A further example of how the duty arises independently of contract is seen when the doctor plays the good Samaritan and treats a patient lying unconscious in the street or where he renders his services gratuitously, i.e. to charity patients. In the circumstances of the former case, no contract can be made, and in the latter the elements of a contract are lacking. However, while the doctor is under no obligation legally to play the good Samaritan or to treat gratuitously, once he embarks upon these courses he is under a duty to render his services skilfully. The basis of the doctor's legal duty of care is well summarized in the following statement:

"But before the duty arises, there must exist the relationship of doctor and patient. If a doctor sees a person lying injured in the street who is in danger of dying of hemorrhage and passes him by, he is not guilty of negligence because there is no such relationship; consequently the doctor owes the injured person no duty. On the other hand, if the doctor plays the part of a good Samaritan and goes to the aid of the injured person, a professional relationship is at once created. It matters not that the doctor has no expectation of reward."²⁸

Whatever the moral or professional issue implicit in these words may be, the legal issue seems clear that while there is no obligation in law for the doctor to treat, once he elects to do so a duty of care devolves upon him and is owed by him to the patient.

The nature of the doctor's duty to his patient demands that in the conduct of a case he apply knowledge, judgment, care, and skill in both diagnosis and treatment. Failure to apply these can constitute a dereliction of duty resulting in malpractice liability. The doctor may fail to apply these professional qualities out of carelessness, intentional disregard, or a lack of knowledge or skill. Whatever the reason, if these elements of care are not present, the doctor is in breach of his duty. The scope of the doctor's duty is such that he may be derelict not only for his affirmative acts but also for his forbearance or omission to act when good practice would demand that he act. Moreover, the duty embraces all aspects of the doctor's service to the patient. Therefore, he may be derelict while wielding the scalpel, administering anesthetic, re-

ducing a fracture, at the bedside diagnosing, seated at his desk, prescribing, or advising.

In discussing the general principles of negligence, it was seen that a certain standard of care must be observed in order to discharge the duty of care imposed by law. In the general law of negligence, the standard of care required is measured in terms of the "reasonable man". It is obvious that this standard cannot be applied to measure the duty of the medical man; his duty is necessarily judged by a more stringent standard.

A person who carries on the practice of medicine is representing to the public that he has the knowledge and skill necessary to carry on such practice.²⁹ The law demands that one so representing himself not only possess the requisite knowledge and skill of his profession but that he use care in their exercise. The standard of care which the medical man must observe has been stated in many ways, but perhaps is best expressed in the oft-quoted dictum of Chief Justice Tindal in the case of *Lampshier and Wife v. Phipos*, 1838:

"Every person who enters into a learned profession undertakes to bring to it the exercise of a reasonable degree of care and skill; he does not undertake, if he is an attorney, that at all events you shall gain your case, nor does a surgeon undertake that he will perform a cure, nor does he undertake to use the highest possible skill. There may be persons who have a higher education and greater advantages and competent degrees of skill, and you will not say whether in this case the injury was occasioned by the want of such skill in the defendant. The question is, whether this injury must be referred to the want of a proper degree of skill and care in the defendant or not."⁸

The standard which the law adopts to determine the doctor's dereliction is the "average practitioner". The proficiency expected of the doctor is measured in terms of the knowledge, skill, judgment and care which one might reasonably expect of the average practitioner of the class to which he belongs. Thus, an intern is judged against the average intern, a general practitioner against the average general practitioner, and a specialist against the average practitioner of his specialty. At no time is the greatest possible skill demanded, nor will a low standard be tolerated. Moreover, the doctor is not required to do the very best of which he is capable. As long as he conforms to a reasonable standard of care which is described in terms of the average practitioner of his class, he has discharged his legal duty to his patient. This is true even if damage has been suffered by the patient as a result of the doctor's acts of commission or omission, for the law does not hold that the doctor, in undertaking the care of a patient, by implication guarantees the result of his art.

It has been stated in some American cases that the standard of care is "that reasonable degree of learning and skill ordinarily possessed by other practitioners in the same locality". However, the validity of this test has been doubted by Commonwealth courts on the grounds (a) that the standard of medical practice should not vary from one part of this country to another, and (b) that all the doctors in a given locality might be deficient in knowledge and skill.^{30, 31}

It would be unreasonable to judge the doctor's duty solely by the abstract expression of a standard of care. On the contrary, the doctor's conduct is judged with reference to the realities of the situation in which he acted and his duty is conditioned by factors of time, place, and circumstances.¹⁶ In other words, a certain degree of care is necessary to meet the standard defined in order to combat an allegation of negligence in a given case. The standard of care is a constant, but the degree of care is a variable. This variable depends upon (a) the actual circumstances surrounding the alleged negligent conduct, and (b) the magnitude of the risks involved in that conduct. Examination of the circumstances in assessing the degree of care exercised may pose questions such as the following: Was the doctor acting in a modern well-equipped hospital? Was he acting in some remote, rural centre? Was he adequately assisted? Did he have available diagnostic and therapeutic facilities? Was he acting in a situation of grave emergency?

In answering these questions, the conclusion may follow that an appendectomy performed on a kitchen table by lamplight in some remote farmhouse conformed to the highest degree. Conversely, it may appear that a similar operation performed in a modern hospital lacked the degree of care necessary to meet the legal standard. A recent court decision originating in British Columbia illustrates how the circumstances in a given instance govern the determination of the question of negligence.³² In that case, the defendant surgeon recommended surgery for a 67-year-old man after a diagnosis by one doctor of gastric ulcer and a presumptive diagnosis by another doctor of gastric carcinoma. At laparotomy, a large gastric ulcer was excised but the surgeon considered the possible presence of carcinoma as well. An experienced pathologist was called in and after examining the specimen by rapid histological technique, he reported that carcinoma was probably present but could not be definitely diagnosed. The surgeon was faced with the alternative of proceeding as if carcinoma was present or terminating the operation at that point and waiting the result of lengthier, more accurate histological examination. The surgeon chose to proceed and perform a partial gastrectomy, pancreatectomy, and splenectomy. Upon the subsequent discovery that no malignancy was present, the surgeon was sued for negligence in proceeding with radical surgery in the circumstances stated. However, the court held on considering the cir-

cumstances that the surgeon's course of action was justified and not negligent.

Similarly, the magnitude of the risk involved in the doctor's conduct must be examined in evaluating the degree of care he has observed. It follows, therefore, that a greater degree of care is demanded of the doctor when he undertakes a procedure involving a known and substantial risk than when he undertakes a procedure to which no risk is normally expected to attach. A simple example is found in x-ray therapy. The risk of burns from undue exposure to x-rays is well known and the degree of care demanded in x-ray therapy is therefore high in comparison with that demanded in venipuncture.

As a rule, the doctor can meet any allegation of negligence by showing that he acted in accord with general and approved practice.³³ This proposition rests on the premise that reasonable practice must be that followed constantly by presumably reasonable people. However, such a proposition must be approached with some caution. It is the courts and not the medical profession which determine negligence, and a practice which has obvious risks may not receive legal sanction merely because it is widely followed. Again, the patient must be protected against the risks of experiment upon him by his doctor. Here a line must be drawn between experimentation *per se* and the utilization of a new therapy which may carry with it some unforeseen hazard. With reservations like these, it is a fair statement that the legal standard of care is observed where the well-trod path of approved practice is followed.

The defence of "error of judgment" to an action alleging malpractice should be mentioned here.¹⁶ While the law acknowledges that professional judgment must be freely exercised, it will not permit the claim of an "error of judgment" to mask a breach of duty. However, the defence of "error of judgment" can be applied in certain cases. For example, a surgeon acting in an emergency may have to exercise his judgment as to what the facts are and if he acts skilfully and carefully according to his conclusion, his error in judgment will not condemn him. Similarly, a physician in diagnosing may be faced with equivocal facts and may have to exercise judgment in interpreting them; or the facts may be unequivocal but point to several diagnoses requiring judgment in the choice of one.

In summary, it may be stated that the standard of care that the law demands of a doctor is the possession of the knowledge and skill of the average practitioner of his class and the exercise of care in their application. The degree of care to meet this standard varies with the circumstances of each case and with the risks involved. At all events, he is not an insurer. He should, in general, conform to approved practice and he must not experiment in the care of his patients.

It is taken as an unquestionable matter of law that the doctor owes a duty to his patient as de-

scribed in the foregoing paragraphs. A fact which is easily overlooked is that the patient also owes a duty, and his failure to discharge this duty can materially affect the question of liability in a suit for malpractice.^{34 35}

The patient's duty requires that he use ordinary care not to cause himself injury or aggravate an injury that is done to him. Furthermore, his duty requires him to minimize the damages flowing from any injury done to him. In discharging this duty, the patient must co-operate with his doctor during the conduct of his case. He must therefore follow the doctor's reasonable orders; he must present himself for examination and treatment when requested, and he must not intentionally withhold material information from the doctor. A patient who is in breach of this duty is himself negligent.

It is obvious that if the damage for which he seeks redress against his doctor is proved to be wholly due to his own negligence, then his action will fail, for his case lacks two of the basic "four D's", dereliction and direct causation. An example of this is seen in a British Columbia case in which a doctor told his patient to massage her injured shoulder and report back to him in four or five days. The patient failed to follow these instructions and sought to hold the doctor legally responsible for a subsequent complication which developed. The patient's case was dismissed because the injury was held to be due to the patient's failure to notify her doctor that her shoulder was not improving.³⁶

However, the case where the injury is due exclusively to the patient's negligence is the uncommon one. In most instances where the negligence of the patient is alleged, the negligence consists of either (a) contributory negligence or (b) failure to mitigate damages.³⁷ Contributory negligence on the part of the patient means that the patient is partly at fault in the occurrence of the injury he complains of, his negligence occurring concurrently with that of the physician, so that each is in part responsible. Failure to mitigate damages means that he has failed in his duty to take all reasonable steps to minimize the effects of an injury done to him. Here the damage is the outcome of the doctor's dereliction, but the patient has acted in such a manner that the original injury was aggravated.

The patient's duty to minimize his damages and the effect of his contributory negligence are two particular applications of the rule of law that there must be a direct causal relationship between the breach of duty and the damages, one of the "four D's" basic to any malpractice action. In either case his right of action exists, but the amount of damages he recovers is limited by the degree of direct causation.

Ordinarily, true contributory negligence occurs less frequently in malpractice actions than a patient's failure to mitigate damages. Often the

distinction between them is difficult to draw, but from a practical point of view this is not an important consideration. The important consideration is that not all the legal duty is owing by the doctor to the patient. The patient also owes a duty, and if the patient fails in this duty, the doctor may be absolved from liability, or damages awarded may be proportionately decreased.

THE ELEMENTS OF PROOF

The law requires that he who alleges negligence must prove negligence.³⁸ Therefore, in any malpractice action the patient bears the burden of proof and it is for him to establish the "four D's" of negligence: Duty + Dereliction + Damage + Direct Causation.²⁴ The patient must prove all of these and his case fails if any one of them cannot be substantiated. For example, suppose in casual conversation with a stranger X, Dr. Y, not having identified himself as a doctor, suggests that X use a particular drug for headache, in consequence of which X suffers a severe reaction. X cannot succeed against Dr. Y because in the absence of a doctor-patient relationship he could not prove the existence of duty.

Similarly, suppose A, a pianist, summons Dr. Y to reduce his Colles fracture and a poor recovery results with deformity. A can prove duty, damage, and direct causation, but his action fails because he cannot prove dereliction since the doctor performed his services with the skill, knowledge, and care of the average practitioner. It is seen, therefore, that the onus of proof falls upon the patient, who must produce sufficient evidence to prove no less than all of the "four D's".

To discharge his onus of proof, the patient's evidence must be sufficient to establish a *prima facie* case, i.e. his evidence must be strong enough to raise in the minds of judge or jury an inference of negligence. What degree of proof will raise such an inference? The essential ingredient of the degree of proof required is that the facts as proved must, on a balance of probabilities, be more consistent with the existence of negligence than with its absence or than with any other rational explanation.³⁸ Once the patient has established a *prima facie* case, the onus of proof shifts to the defendant doctor, who must then rebut, by the evidence he presents, the inference of negligence which has been raised, and if he fails to do this, the plaintiff-patient's claim is successful.

Generally speaking, the patient must prove his allegations of negligence by the expert testimony of medical witnesses.² The law does not consider judges and juries competent to entertain opinions on standards of medical practice, for such opinions can logically be held only by doctors. Only expert medical witnesses are competent to testify in a given case whether the doctor-defendant exercised the requisite degree of skill and care, and a judge or jury depends upon such testimony in concluding

whether an inference of negligence is raised. The requirement that the patient prove his case upon the testimony of medical experts is eminently reasonable. Otherwise, judges and juries would be invited to speculate upon matters manifestly beyond the scope of their knowledge and experience. As a rule, then, the plaintiff's case will fail unless one or more doctors come to court and give testimony to the effect that the acts of the defendant-doctor fell short of the standard of skill and care demanded by law.

However, the testimony of medical experts is not always necessary for the plaintiff to prove his case. An interesting exception to the general rule is found in that class of case in which the legal doctrine "*res ipsa loquitur*" is held to apply. This doctrine is part of the general law of negligence, but it has been applied to medical malpractice cases. The phrase "*res ipsa loquitur*", literally, means "the thing speaks for itself". It was first uttered by the English jurist, Baron Pollock, in the course of a case in which a barrel of flour rolled out of an open doorway on the upper floor of the defendant's warehouse and fell upon the plaintiff, a passerby in the street below. It was held that the plaintiff need not, indeed, could not, prove that the defendant was negligent and that the fact that the barrel rolled out and struck the plaintiff was sufficient evidence from which a jury might infer negligence. The improbability that such an accident could occur in the absence of negligence was sufficient to justify a jury in finding that it was the result of negligence.³⁹ *Res ipsa loquitur* — the thing speaks for itself.

The general rule that the burden of proof is on the plaintiff who must raise an inference of the defendant's negligence works an obvious hardship on the plaintiff. The plaintiff may be able to prove his injury, but the manner in which this injury came about may rest solely within the knowledge of the defendant who caused it. It was to relieve this hardship that the doctrine *res ipsa loquitur* has been invoked.

In what circumstances is this doctrine applicable? It has been held to apply to that class of case where:^{2, 39}

- (a) the damages suffered by the plaintiff arise out of an occurrence which ordinarily does not occur in the absence of negligence on the part of someone, and
- (b) the occurrence is caused by some instrumentality within the exclusive control of the defendant.

Where the plaintiff has proved these facts, he has made out a *prima facie* case and will succeed in his claim unless the defendant can offer a reasonable explanation of how the accident occurred without his negligence.

The doctrine of *res ipsa loquitur* was at one time held inapplicable to malpractice suits, but in recent years it has been invoked with increasing

frequency in this field of litigation, most commonly in cases in which foreign matter like swabs or instruments have been left in the patient's body. By way of illustration, an English case where a swab was left in a patient after an operation and Goddard, L. J., invoked the doctrine in these words:

"The surgeon is in command of the operation, it is for him to decide what instruments, swabs, and the like are to be used, and it is he who uses them. The patient, or, if he dies, his representatives, can know nothing about this matter. There can be no possible question but that neither swabs nor instruments are ordinarily left in the patient's body, and no one would venture to say that it is proper, although in particular circumstances it may be excusable, so to leave them. If, therefore, a swab is left in the patient's body, it seems to me clear that the surgeon is called on for an explanation, that is, he is called on to show not necessarily why he missed it, but that he exercised due care to prevent it being left there."⁴⁰

But judicial opinion is not unanimous on the applicability of *res ipsa loquitur*. In the same case, Scott, L. J., dissented from the majority of the court with this statement:

"How can the ordinary judge have sufficient knowledge of surgical operations to draw such an inference (that this does not happen in the ordinary course of things without negligence). . . . What does he know of the ordinary course of things in a complicated abdominal operation? And if he does not know, is expert evidence admissible to supply the judicial lack of knowledge?"⁴⁰

Res ipsa loquitur is not, however, limited to "swab" or "instrument" cases. It has been held to apply in the following cases:⁴¹

Where a patient received a burn on the buttock during the administration of electric coagulation treatment in an operation.

Where a patient suffered a burn during an x-ray examination.

Where an unconscious patient suffered burns by application of a hot water bottle to his feet.

Where a patient underwent surgery to correct a Dupuytren's contracture of two fingers of one hand and two weeks postoperatively on removal of the splint, it was found that the whole hand was affected.

In this last cited case, the words of Denning, L. J., illustrate well the mechanism of *res ipsa loquitur*:

"If the plaintiff had to prove that some particular doctor or nurse was negligent, he would not be able to do it. But he was not put to that impossible task: he says, 'I went into the hospital to be cured of two stiff fingers. I have come out with four stiff fingers, and my hand is useless. That should not have happened if due care had been used. Explain it, if you can!'"⁴²

The doctrine of *res ipsa loquitur* has been severely criticized, particularly in the face of modern trends to extend its application to a greater number of complicated medical cases. It has been said of it that:

"It adds nothing to the law, has no meaning which is not more clearly expressed for us in English, and brings confusion to our legal discussions. It does not represent a doctrine, is not a legal maxim, and is not a rule."²

One medicolegal expert calls this extension of *res ipsa loquitur* "a 'rule of sympathy' because in my opinion it is based on the sympathy the courts feel for a badly injured patient who was unconscious on the operating table at the time of his injury, whereas the defendant-doctor was fully aware of what went on."²

The effect of permitting more and more cases to fall within the scope of this doctrine is to reverse the onus of proof and negate the principle of law that he who alleges negligence must prove it. Furthermore, it invites juries to draw inferences of negligence out of complex medical and surgical circumstances which are hopelessly beyond the scope of their knowledge. By logical extension of this trend, every untoward result may raise an inference of negligence on the part of the doctor. The doctor would thereby become an insurer of his services which the law declares he is not. If such circumstances were to arise, it would be a courageous man indeed who would even venture to practise medicine.

PAGES OUT OF THE PAST: FROM THE JOURNAL OF FIFTY YEARS AGO

A curious case came up in the Ontario courts before Mr. Justice Riddell in December. Counsel on behalf of a physician who had been charged before a magistrate with having performed an illegal operation, and acquitted, applied to the court asking that the Ontario College of Physicians and Surgeons be prohibited from proceeding with any investigation into the charge. Judge Riddell decided that inasmuch as the legislation upon which the case rested gave the college the right to enquire into any

case where a doctor was accused either of a criminal offence or of "infamous and disgraceful conduct", the college had the power to investigate a criminal offence, when it was also professionally infamous misconduct. The law merely prevented a further investigation in another criminal court, and was clearly meant to give the Medical Council power to proceed with an enquiry, whether or not a court conviction had been made.—*Canadian Medical Association Journal*, 1: 75, January 1911.

SHORT COMMUNICATION

ANAEROBIC FLORA OF CHRONIC
NASAL SINUSITIS IN ADULTS*

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INTRODUCTION

THE BACTERIAL flora of chronic sinusitis has seldom been studied in earnest;⁸ some authors even report that bacteriological examination is often negative.¹²

The importance of this study was stressed by Natali:⁵ "Les atteintes bronchiques seront améliorées par la guérison du foyer infectieux sinusal." And although Updegraff¹⁰ states that "treatment of chronic sinusitis is largely surgical in one form or another," the very fact that antimicrobials are recommended by practically every expert on the subject¹ reveals their silent conviction that bacteria do play some part in the causation of the disease. Nonetheless, Smathers¹¹ reports that the yearly incidence of acute and chronic sinusitis has not been altered by the more extensive use of the antibiotics, and Irsigler³ comments that "even with modern chemotherapy the intracranial spread of rhinogenous infections cannot be obviated."

Two French reports, however, throw some light on the subject. In 1959, Sergent and Joly⁹ published a detailed analysis of the bacterial flora from 13 cases: not a single anaerobic bacterium was mentioned, and the technique of culture was not described. On the other hand, Prévot⁶ made it known in 1947 that an autogenous vaccine prepared from the anaerobes found in such cases, when used as therapy, had given a very high percentage of cures. Beyond mention of the fact that several species of anaerobic bacteria were frequent, no actual statistics were given.

Personal experience with Prévot's technique for growing the anaerobes,⁷ as well as that for preparing his type of autogenous vaccine, prompted us to make a detailed study of the bacterial flora from more than 50 cases of chronic sinusitis in adults. Diagnosis of the disease was made by Drs. Comeau and Roy of the St-Joseph de Rosemont Hospital with the help of radiographs and other techniques; details of this study will be reported elsewhere.

This aspect of our work was considerably eased by the recent development by two of us of a selective medium which will rapidly segregate the anaerobes from a mixture of both aerobic and anaerobic bacteria.²

METHODS

Sampling of the maxillary sinuses was carried out as early as possible in the morning in order to

minimize contamination of the antra by bacteria from the air and surroundings. The patient was asked to blow the contents of each nostril into a sterile Petri dish; from this the usually viscous and sometimes yellowish secretions were transferred with a swab into two tubes of freshly regenerated trypticase soy broth (BBL) or Vf broth prepared locally.⁷

The seeded tubes (usually screw-capped for ease of transportation) were then placed in the incubator at 37°C. After 24 and 48 hours, Gram-stained smears were examined and isolations were made with the help of the deep agar technique, using a selective medium made up by adding 0.05% sodium azide and 1% agar to trypticase soy broth (BBL). This medium practically inhibits all but the anaerobic bacteria, which can then be more easily isolated and identified. The remainder of the original trypticase fluid cultures were left in the incubator for a total of seven days before they were used for preparing an autogenous vaccine. (This aspect of the method will also be reported on by Drs. Comeau and Roy.)

TABLE I.—BACTERIAL FLORA OF CHRONIC NASAL SINUSITIS IN ADULTS

Case	Aerobes	Anaerobes
1	<i>Staph. aureus</i> , <i>A. aerogenes</i>	Not done
2	<i>Staph. aureus</i> , <i>Ps. aeruginosa</i>	Not done
3	<i>Staph. aureus</i>	Not done
4	<i>Staph. aureus</i> , <i>Pr. mirabilis</i>	Not done
5	<i>Staph. aureus</i> , <i>Ps. aeruginosa</i>	No growth
6	<i>Staph. aureus</i> , <i>Pr. mirabilis</i>	Not done
7	<i>Staph. aureus</i>	Not done
8	<i>Staph. albus</i> , <i>A. aerogenes</i> , <i>Kl. pneumoniae</i>	No growth
9	<i>Staph. aureus</i> , <i>Kl. pneumoniae</i>	Slender Gram-positive rods
10	<i>Ps. aeruginosa</i>	Slender Gram-positive rods
11	<i>Staph. albus</i> , <i>Ps. aeruginosa</i>	No growth
12	<i>Staph. albus</i> , <i>E. coli</i>	No growth
13	<i>Staph. albus</i>	No growth
14	<i>Staph. aureus</i>	Slender Gram-positive rods
15	<i>Staph. aureus</i>	Slender Gram-positive rods
16	<i>Staph. albus</i> , <i>Ps. aeruginosa</i>	Slender Gram-positive rods
17	No growth	No growth
18	<i>Staph. albus</i>	Not done
19	<i>Staph. albus</i> , <i>E. coli</i>	Not done
20	<i>Staph. aureus</i> , <i>Str. viridans</i>	Not done
21	<i>Staph. aureus</i>	Not done
22	<i>E. coli</i> , <i>Pr. mirabilis</i> , <i>Staph. albus</i> , <i>Str. viridans</i>	No growth
23	<i>Staph. aureus</i> , <i>Str. viridans</i>	Not done
24	<i>Staph. aureus</i>	Not done
25	<i>Staph. aureus</i> , <i>Kl. pneumoniae</i>	No growth
26	<i>Staph. aureus</i>	Gram-positive rods
27	<i>Staph. aureus</i> , <i>E. coli</i>	No growth
28	<i>Staph. aureus</i> , <i>Streptococcus</i> spp.	No growth
29	<i>Ps. aeruginosa</i>	Diplococcus spp.
30	No growth	No growth
31	<i>Staph. aureus</i> , <i>Pr. mirabilis</i> , <i>Ps. aeruginosa</i>	Diplococcus
32	<i>Staph. albus</i>	No growth
33	<i>Staph. aureus</i>	No growth
34	<i>Staph. aureus</i>	No growth
35	<i>Pr. mirabilis</i> , <i>E. coli</i>	<i>Neisseria</i> spp.
36	<i>Staph. aureus</i> , <i>E. coli</i>	Diplococcus spp.
37	<i>Staph. aureus</i> , <i>A. aerogenes</i>	No growth
38	<i>Staph. albus</i> , <i>Pr. mirabilis</i> , <i>E. coli</i>	No growth
39	<i>Ps. aeruginosa</i>	No growth
40	<i>Staph. aureus</i>	No growth
41	<i>Staph. aureus</i>	No growth
42	<i>Pr. mirabilis</i> , <i>E. coli</i>	Diplococcus spp.
43	<i>Staph. aureus</i> , <i>E. coli</i> , <i>Pr. mirabilis</i>	No growth
44	<i>Str. viridans</i> , <i>Staph. albus</i>	No growth
45	<i>Staph. aureus</i>	No growth
46	<i>Ps. aeruginosa</i>	No growth
47	<i>Staph. aureus</i> , <i>E. coli</i> , <i>Pr. mirabilis</i>	Diplococcus spp.
48	<i>Staph. aureus</i>	Gram-neg. cocci and rods
49	<i>Staph. aureus</i> , <i>E. coli</i>	Slender Gram-pos. rods
50	<i>Str. viridans</i> , <i>Staph. aureus</i>	No growth
51	<i>Staph. aureus</i>	No growth
52	<i>Staph. aureus</i>	No growth
53	<i>Staph. albus</i>	No growth
54	<i>Staph. aureus</i>	Slender Gram-positive rods
55	<i>Staph. aureus</i>	Slender Gram-positive rods
56	<i>Staph. aureus</i>	Slender Gram-positive rods
57	<i>Staph. aureus</i>	Slender Gram-positive rods

*From the Institute of Microbiology and Hygiene of the University of Montreal.

Once pure cultures of the anaerobic species had been obtained, they were identified with the help of Prévot's methods.⁴

The aerobic bacteria were isolated from the original fluid trypticase cultures with the help of the usual methods (blood agar, MacConkey's agar, etc.).

RESULTS

The results in 57 cases are given in Table I. It can be seen that anaerobes were present in 18 of 45 cases in which they were specifically sought, i.e. 40%. In other words, the bacterial flora of chronic sinusitis is highly variable, and no stock vaccine can take account of these fluctuating incidences.

The results reported here point for the first time to the important role that the anaerobes play in chronic sinusitis. It is evident that the method of sampling was not ideal, and for this reason no emphasis will be placed on the frequency of the various species found at this time. Another series of such studies is being contemplated with the intent of sampling by direct puncture of the sinus cavity, thereby ensuring a more representative sample of the flora responsible for the disease. It is hoped that under such conditions more reliance can be laid on the significance of the anaerobes in such a closed cavity, as well as on the success of treatment by autogenous vaccine.

Under these circumstances, it can readily be understood why the antibiotics do not very often afford complete cure. Moreover, the difficulty of reaching into the sinus itself is not unimportant. This is the reason why Prévot recommends that the

autogenous vaccine be prepared in the form of an ointment made with a menstruum which will melt at body temperature and will penetrate into the sinus more easily at bedtime if the surface tension of the vehicle is low enough.

SUMMARY

Bacteriological analysis of material from more than 50 cases of chronic sinusitis has revealed the presence of anaerobic bacteria in 40%. This would seem to be the first time that anaerobes have been implicated to such a high degree in this disease. These results might explain to a certain extent the reported failure of treatment of this condition by stock vaccines and antibiotics.

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RÉSUMÉ

L'analyse bactériologique dans une cinquantaine de cas de sinusite chronique a révélé la présence de bactéries anaérobies dans 40% des spécimens.

Il semble que ce soit la première fois que les anaérobies soient impliquées à un aussi haut degré dans cette affection.

Ces résultats pourraient expliquer l'échec des stock-vaccins ainsi que des antibiotes.

PAGES OUT OF THE PAST: FROM THE JOURNAL OF FIFTY YEARS AGO

RES JUDICATAE

The New Treatment of Syphilis

So many new facts concerning syphilis have crowded upon us of late years that a readjustment of our ideas concerning this disease has been rendered necessary. Animal inoculation, the *Spirochaeta pallida*, the Wassermann reaction, and now "606", have so altered our former concepts that there is some danger of losing those teachings of our elders, without a true recognition of which our later knowledge is, and will be, far from complete.

It is, therefore, in season that in respect to Ehrlich's new compound, attention should be called to the fact that syphilis in the past has been, on the whole, well treated by mercury and potassium iodide, and that, where intelligently used, it has been the exception, rather than the rule, for these drugs to fail. Nevertheless, it must be admitted that such cases do occur, and in sufficient numbers to cause us to welcome gladly any such discovery, or better, any such invention, as Ehrlich has found. Whether, at this date, we can go so far as Neisser, and declare that every case of primary or secondary syphilis should be advised to undergo treatment with this compound, our experience is as yet too limited to permit of a conclusion . . .

In these present days, when the press and the popular monthly magazine have brought "606" before the public, both in Germany and America, it is incumbent on us to be doubly cautious in drawing conclusions as to its efficacy . . . According to Professor Ehrlich, not only does the compound

act by killing the spirochaete, but also by producing some antibody. Evidence of this is seen in the change in the Wassermann reaction, but especially in the fact that nursing mothers, who have received "606", can cure their syphilitic infants by continuing to nurse them. And yet the quantity of arsenic in the milk is scarcely recognizable. There must, therefore, be some other body, antagonistic to the *Spirochaeta pallida*, which effects this improvement.

There is still much that we need to know. What is to be the future of these cases, even if, after one or two doses, no further signs develop, and the Wassermann reaction becomes negative? What relation must the size of the dose bear to the virulence and stage of the disease? Are mercury and potassium iodide to be used along with "606" in order to make assurance doubly sure, or can "606" be solely relied upon? "606" is a brilliant discovery, as brilliant as antidiphtheritic serum, but it has to cure a disease which is the most chronic and persistent of all diseases, and it behoves us to be doubly cautious in our conclusions. There is a certain definite *Begeisterung* of the public mind, not to speak of the medical world, and it is not improbable that some published results are affected thereby. Let us keep an open mind, but in all thankfulness and in all admiration of a great achievement, in all recognition of what "606" has done, and to what it promises to do, let us have patience to note its actual results, favourable and unfavourable. Syphilis is not yet harmless, is not even on its last legs. Would that it were, but it has surely received a serious blow.—*Canadian Medical Association Journal*, 1: 76, January 1911.

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EDUCATING THE PUBLIC ABOUT CANCER

A SERIOUS defect of many otherwise well-conceived schemes of cancer education has been the lack of any attempt to evaluate results. The paper by Phillips and Taylor in this issue of the Journal is therefore a most welcome and valuable addition to our knowledge. This new survey of public opinion in Canada amplifies the information gained from the earlier survey in 1954 and allows some comparison with a matching survey carried out in England.

The results show a steady all-round improvement in knowledge about cancer among Canadian women. An improvement was also revealed in our Manchester survey, but the new survey confirms that Canadian women are generally better informed than their English counterparts. This was known before, but it is most interesting to see that despite the differences both countries are confronted with the same problem (though perhaps in different degree), that underlying fear of cancer is still a bar to action and that knowledge of facts alone is no guarantee of rational behaviour.

The new survey shows, for example, that while 87% of women now know that a lump in the breast may mean cancer, 80% do not conduct self-examination. But is the problem really that of persuading women to look for lumps (most are found fairly early anyway), or of persuading them that they will be better off for seeking prompt medical advice when they do find a lump? We have come across several patients who sought medical advice only on learning that a breast lump could well be caused by something *other* than cancer. The proportion of women who know that irregular bleeding may be a first sign of uterine cancer is small (66%), but would a greater awareness of the possible link between unexplained bleeding and cancer make for less delay, or would it merely cause some women, who now consult their doctors quite freely, to develop irrational fears and avoid seeking advice?

It is impossible for any cancer society to disseminate propaganda that is not inevitably linked with cancer, but it may be worth considering whether, in a climate in which fear plays such a large part, there may be too much emphasis on the *likelihood* that certain signs may mean cancer. Could it be that a program based on teaching "danger signals" may in fact be self-nullifying while fear of cancer plays so large a part in our thinking? The valuable investigation by Henderson, Wittkower and Loughheed¹ into the psychiatric problems of delay in seeking medical care in Canada directed attention to this aspect of the problem: "Cancer education must be optimistic and reassuring; to accent key symptoms of the disease in many cases increases anxiety already present in individuals . . . Propaganda based on recovery is more likely to be successful than propaganda on fear. Fear of the consequences used as a means of propaganda may defeat its objective and may foster and reinforce denial mechanisms rather than remove them."

In their present study, Phillips and Taylor also focus attention on the need for honest appraisal of the methods used to impart information. In the past, those responsible for cancer education have been too ready to adopt uncritically the publicity techniques that have worked in other fields of health education. But the problem of delay in cancer is different in many ways from other problems in public health. It is a highly emotional topic in which deeply ingrained fears, prejudices and irrational beliefs are set against the background of man's centuries of experience of cancer as an inevitably fatal disease. A problem of this kind is not amenable to logic alone, however lucid; and so it calls for something more than the traditional appeals to reason dressed up in the current techniques of mass communication.

Most pamphlets about cancer (from every cancer organization in the world!) have been awful examples of how not to influence people. Many are eye-catching and elegant in design, but all the resources of modern typography cannot conceal the poverty of the material they present. Almost without exception they preach, or exhort their readers to sensible behaviour, while warning them of the consequences of failing to mend their ways. The ideal pamphlet would not seek only to instil facts into its readers: it would try to counteract pessimism, to erode some at least of the hard crust of fatalism that is still common, and to leave the individual emotionally convinced that he will really be better off for seeking prompt medical advice. But printed matter for mass distribution is an impersonal means of communication (perhaps this is why in Canada television scores by being the nearest thing to person-to-person contact), and it is difficult to conceive of any pamphlet that could really influence people's attitudes to cancer when their fears and emotions are so much involved. One can visualize fruitful uses for pamphlets to augment, or provide a reminder of, information

conveyed in some more personal way; but more organizations should do as the Canadian Cancer Society has done, and ask themselves *not* "How many thousand pieces of literature did we distribute this year?", but "What good did they do? Did they reach the kind of people for whom they were written? Or were they written as if the whole population was composed of identical individuals?" The rest of the world has much to envy in the record of the Canadian Cancer Society in the field of public education. Its new survey and the conclusions drawn from it are a fine example to others who might otherwise be tempted to mistake effort for achievement.

JOHN WAKEFIELD
AND RALSTON PATERSON

Manchester, England

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THE CLINICAL SIGNIFICANCE OF RESEARCH ON HUMAN SEX CHROMOSOMES

HUMAN chromosomes have been studied for over half a century but knowledge in this field has expanded rapidly since 1956 when Tjio and Levan¹ reported the finding of 46 chromosomes in cells from human fetal lung cultures, instead of the 48 previously accepted as the normal number for many decades. The sex chromosomes are represented by an XX complex in the normal female and an XY complex in the normal male. Recent advances in the study of cytogenetics have come thick and fast, largely owing to the improvements in investigative technique made possible by the use of antibiotics during tissue culture, the use of colchicine to arrest cell division at a stage suitable for chromosome counting and analysis, and the use of hypotonic solutions and "squashing" to separate and flatten the chromosomes.

The revolutionary findings of Tjio and Levan were rapidly confirmed, and measurements and proportions of each chromosome were established so that identification of many chromosomes in most cells, and perhaps all chromosomes in the rare ideal cell, was possible. Some initial inconvenience was caused by the multiplicity of systems used for numbering the chromosomes. This has been resolved by the recent adoption of a standard system for this purpose (Denver).

Human chromosomes can be placed into seven groups according to their size and the position of their centromeres. The identification of individual chromosomes within each group presents a greater problem, but many can be identified by the presence of characteristic satellites and by careful comparison of individual chromosomes cut from a photograph of one cell. When these cut-out chromosome photographs are arranged in approximately descending order of size, the resulting pattern is

referred to as a karyotype. The tiny Y chromosome can normally be positively distinguished, but identification of the medium-sized X is extremely difficult.

Another great technical breakthrough was brought about by the very recent development of a simple method for culturing peripheral blood cells. Previous studies were carried out on cells from the bone marrow, fascia, skin and other tissues. These entailed some discomfort for the patient and involved considerable inconvenience in obtaining repeated samples from apparently unaffected relatives. In addition, blood cells seem ideal for chromosomal studies since, to date, their use has permitted the recognition of patients with mosaicism who have at least two chromosomally distinct cell populations.

The great advances that have recently been made in our knowledge of sex chromosome anomalies have been correlated with the sex chromatin patterns and summarized in a recent article in this Journal by Professor Barr,² who originally described the significant difference in sex chromatin patterns between the two sexes.³ Chromosome analysis of intersex problems can be considered an extension of the sex chromatin test.

The sex chromatin test has now assumed even greater importance since the advent of improved techniques for chromosome studies. It can be used as a diagnostic test in suspected intersex states and in screening large populations for sex chromosome anomalies, and is an indispensable aid in interpreting chromosome abnormalities in the 6-12 group. Although the exact nature of sex chromatin is still debatable, it will doubtless become more apparent as further abnormal cases are described and studied. It is now certain that the sex chromatin mass is related to the sex chromosome complex, and there is very substantial evidence to suggest that it represents a heteropyknotic or densely staining portion of an X chromosome. This heteropyknosis has been related to the state of hydration of the chromosome, but it is not known why the X chromosome differs in this property from morphologically similar autosomes (non-sex chromosomes).

The buccal or vaginal smear method for the identification of sex chromatin has many advantages over that involving the study of blood cells, particularly in subjects with suspected chromosome anomalies. In patients with XXX, XXXY and XXXX chromosome combinations, an extremely high proportion of the buccal cells contain sex chromatin and many contain more than one mass of this material, but parallel studies reveal that the blood neutrophils of such individuals are virtually indistinguishable from those of a normal female.

The sex chromosome anomalies are of special interest, since the individual seems able to survive despite wide variations from the normal number. Abnormalities affecting the X chromosome differ markedly in their clinical effects, depending on

whether their number is above or below that of a normal female.

The individual with classical chromatin-negative Turner's syndrome has 45 chromosomes with an XO sex chromosome complex. Many clinical variations of this syndrome have now been reported; some patients had histologically normal ovaries, and one gave birth to a normal son. The less common chromatin-positive Turner's syndrome also shows variations since three cases with 46 chromosomes, but an abnormal pattern including a single X, have been reported, and two others have been described with a 45 XO pattern. One patient with Turner's syndrome who showed a "midway" chromatin pattern has also been described, with a deletion of part of one X chromosome resulting in a 46 Xx pattern. In this case the sex chromatin test showed a mass which was smaller and was seen in fewer cells than in normal females.

Abnormal karyotypes in females with extra X chromosomes show surprisingly minor defects. These patients are usually fertile but mentally retarded, although exceptions to this occur.

Many examples have now been reported of the so-called "superfemale" state where an extra sex chromatin mass and an extra X chromosome have been demonstrated. The original patient, reported by Jacobs,⁴ had primary amenorrhea although all those subsequently reported have appeared to ovulate normally and many have borne children, including one patient with nine children reported by Barr.² The term "superfemale" was used originally by analogy with the triple X state found in the female banana fly. In this state, the fly has exaggerated secondary sex characteristics, but the "super-human-female", by contrast, is usually physically normal though frequently mentally retarded. There are many obvious objections to the term "superfemale" but alternatives such as "meta-female" are little better and the non-descriptive term "triple X" is probably least objectionable.

The first description of patients with some cells containing three sex chromatin masses and a presumed XXXX sex chromosome complex is reported from Dr. Barr's laboratory in this issue of the Journal. It must have been tempting to coin the term "super-duper-female" to denote the latter, but apparently conservatism prevailed and Drs. Carr, Barr and Plunkett chose instead to term this simply a "tetra X" anomaly. The two patients with this anomaly described in this issue were mentally retarded females. The anomaly was detected by means of the sex chromatin test, and further study revealed that both patients had 48 chromosomes. The identification of the two extra chromosomes was supported by karyotypes made from 15 cells, and mosaicism was reasonably excluded by detailed analysis of cells with counts which differed from the modal number of 48.

Several chromosome abnormalities have been described, and many other cases provocatively referred to in these two papers from Dr. Barr's

laboratory. It might seem unusual that so many cases should appear so rapidly in one centre. Actually, this galaxy of patients represents a result of many years of labour with sex chromatin screening tests.

Patients with chromatin-positive Klinefelter's syndrome have been shown to have 47 chromosomes with an XXY complex. Variants of this syndrome have now been described with XXXY, XXXY, and some cases of mosaicism, including XXY as one of the two cell populations. The patient with chromatin-negative Klinefelter's syndrome had a chromosome complex indistinguishable from that of a normal male.

With the acquisition of karyotypes from further abnormal cases, certain basic statements about the effect of sex chromosomes on human sex differentiation can be made. Unlike its counterpart in the banana fly, the tiny, human Y chromosome carries strong male-determining factors. This effect is exerted even when it is outnumbered by X chromosomes as in Klinefelter's syndrome XXY and its variants XXXY and XYY. However, in two chromatin-negative conditions, namely testicular feminization and pure gonadal dysgenesis, sex differentiation is female in spite of a normal male chromatin pattern.

In true hermaphroditism, a chromosome anomaly might be anticipated. The majority of individuals with this disorder are chromatin-positive and to date have shown no differences between their chromosome pattern and that of normal females. On this evidence it is difficult to explain the formation of a testis in the true hermaphrodite. Chromatin-negative true hermaphroditism is less common. To date, only one such subject has been examined. This patient showed a mosaic state with an XY/XO constitution.⁵

All of the phenotypic male patients with sex chromosome anomalies so far described have been sterile. Many of the female patients with sex chromosome anomalies are fertile, particularly those with so-called "superfemale" states. In this respect the anomalies in the two sexes are similar to those of hybrids produced between different animal species. The male hybrids are invariably sterile but several fertile female hybrids have been reported. It was originally predicted that the offspring of fertile patients with sex chromosome anomalies would often be abnormal but this prediction has not been borne out.

It has been suggested that long or eponymic names of many intersex states be discarded in favour of the shorter sex chromosome abbreviations, such as XXY for chromatin-positive Klinefelter's and XO for chromatin-negative Turner's syndrome, but recently a 45/XO-state in a chromatin-negative boy⁶ and a 45/XO-state in a chromatin-positive girl have been reported which make the use of such abbreviations undesirable.

Among the sex chromosome anomalies unreported but presumed to exist are XYY, various

mosaics including XY/XXXY, a mongol "super-female" and a mongol with Turner's syndrome. The latter two conditions may not be so difficult to find, since two cases of mongolism with Klinefelter's syndrome have already been reported.

Chromosome analysis is at present a research tool but there is a tendency for the research method of today to become the routine of tomorrow. An early practical use for this form of investigation will be in the diagnosis of mongolism in patients whose handprint analysis is in the range that overlaps the normal.

Chromosome studies are now being performed at many centres and a great deal of information will be accumulated if eventually all proven or strongly suspected sex chromosome anomalies are investigated. Rare congenital syndromes, particularly those associated with multiple malformations, should be analyzed to detect autosome anomalies. The general physician can make a considerable contribution to the knowledge in this field by bringing unusual cases to the attention of those working in chromosome laboratories.

Future research must concentrate on better methods of differentiating the chromosomes, particularly those of the 6-12 group. It is remotely possible that a differential staining method or some as yet unthought of technique may even enable us to define the paternal and maternal contribution to each chromosome pair or facilitate the detection of some types of carrier states. P.E.C.

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A SOVIET PHYSICIAN'S VISIT TO CANADA

IN February of 1960, Professor A. N. Shabanov of Moscow visited Montreal, Toronto and Ottawa at the invitation of the College of General Practice of Canada. A detailed report of his impressions gained during this twelve-day Canadian visit was recently published in a prominent Russian medical journal (*Sovetskaya Meditsina*, No. 9: 149, 1960). Therein Professor Shabanov describes to his readers the various scientific sessions and

pharmaceutical and scientific exhibits at the Fourth Congress on General Practice which he attended as an invited guest. He attempts to explain to Soviet physicians the role of the Canadian general practitioner, who, interesting to relate, is compared to the pre-revolutionary country doctor in Russia. (The country doctor of Czarist days was characteristically a superior type of dedicated general practitioner whose disappearance under the communist regime has evoked expressions of regret even by some medical personalities in present-day Russia.)

Mention is made of the Institute of Experimental Medicine and Surgery of the University of Montreal, and the Montreal General and Notre-Dame Hospitals, with emphasis on certain features of each of these institutions. Professor Shabanov writes admiringly of the fact that over 1000 papers have been published by Professor Selye's staff since the Institute of Experimental Medicine and Surgery was founded in 1945. The Hospital for Sick Children and the Department of Medicine of the Toronto General Hospital are singled out for special mention in the account of his Toronto visit. The nursing school of the Ottawa Civic Hospital also excited the visitor's admiration. While stressing the excellence of hospital facilities, Professor Shabanov commented on the high cost of hospital treatment, which amounts to some \$24 per day. He was impressed by the remark of an unnamed Canadian public figure who informed him that in this country only the very wealthy or the very poor can afford to be sick and that to a middle-class citizen prolonged illness may constitute a catastrophe capable of exhausting his life's savings. The visitor was apparently unaware of the existence of hospital services insurance or of the various voluntary medical care insurance plans available to Canadians. The organization of Federal and provincial departments of health and welfare is described at some length, and brief mention is made of the health services for Indians and Eskimos. In his concluding comments Professor Shabanov emphasizes his conviction that participation in such international and national congresses should be more widely encouraged to provide valuable contacts and exchange of ideas and information among physicians working in the various fields of medicine throughout the world. W.G.

PAGES OUT OF THE PAST: FROM THE JOURNAL OF FIFTY YEARS AGO

There is probably more bad writing in medical journals than in any other kind of periodical. For this there is a variety of reasons. Medical men are without leisure, and there is so much in medicine about which something may be written, that they lose their way. Besides, it is a common delusion that the mere fact of attendance for four or five years upon lectures in a faculty of a university confers upon a man those qualities of aptitude, precision, and harmony, which are commonly called style. On the contrary, the pursuit of a single, dominating interest, as Mr. Asquith

told the students of Aberdeen University, limits a man's breadth of outlook and the range of his intellectual curiosity; it dulls his zest and diminishes his eagerness to know and integrate into himself the best that has been thought and written for the enrichment of his mind. In short, it is a bar to the perception of what is good and what is evil in the art of writing.—Excerpt from an editorial, "Style in Medical Writing", *Canadian Medical Association Journal*, 1: 71, January 1911.

LETTERS TO THE EDITOR

PSYCHOANALYSIS

To the Editor:

I am somewhat puzzled by Dr. Makins' clarification, to say the least (*Canad. M. A. J.*, 83: 1115, 1960).

He certainly does not praise psychoanalysis, yet that which he does condemn is not "long-term Freudian style psychoanalysis" as he calls it, by any known definition. I was shocked to hear that (what I understand by) psychoanalysis was a miserable flop, then stunned to hear that a pill was far superior! Furthermore, I wondered about a "family doctor" psychoanalyzing a patient before surgery. Firstly, I doubt whether the poor patient could afford the time for a psychoanalysis (about five years plus) before having his gallbladder removed. Secondly, I wonder whether a "family doctor" would be willing to tackle a technique which psychoanalysts require a minimum of 10-12 years to learn (post M.D.).

What "subtle conversation", something called "preserving the deception" and all this "modern" terminology has to do with his clarification is debatable. These could be techniques essential to some special analytic "method" which Dr. Makins has devised.

R. N. BORSCH, M.D.

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MEDICAL PRACTICE IN THIS
BRAVE NEW WORLD

To the Editor:

Recently I have had to spend several hours spread over several weeks with a patient and his family, in my office, on the telephone and so on. Several notes were exchanged by mail and there were frenzied conversations with my secretarial staff and partners. The subject of this activity was the insurance coverage of this family during the previous five months.

I am now resolved to propose a new organization which would step into the breach the moment a claim is made — just as the insurance adjusters do when claims involving an auto accident are being proposed.

The advantages for the patient would be many indeed. He could have someone with whom to discuss his problems, financial, social and otherwise, and the much needed assistance in filling out forms would be readily available. He could be instructed to make the right answers — the ones which would have the greatest effect in prying out the greatest amount of money to defray his health expenses. The charges for this service would be included (hidden neatly) in the premiums the patient and his employers pay.

For the doctor there would be manifold advantages also. He, too, would have another party with whom to discuss his problems and he too would appreciate assistance in filling out forms. Instruction on which answers to put where, which drugs to list, where a radiograph was taken — on all these things an expert's opinion could be useful; and then, of course, the diagnosis is often a problem. One frequently has the impression that as soon as one writes certain diagnoses

on insurance forms, someone chuckles — the patient, the doctor, the secretary, or the insurance official. As a general rule these diagnoses should be avoided — on insurance forms at any rate.

Since we are now dealing with government or quasi-governmental bodies, on frequent occasions, the proposed agency would necessarily have staff to cover the various levels, federal, provincial and municipal.

As one can see, the possibilities for the proposed agency are unlimited. Indeed, with vision — the current unemployment problem could be solved since we should need more filing cabinets, more telephones, more secretaries, more paper, etc. The fact that we would need more doctors should not be forgotten either.

If anyone is interested in contributing his opinions on this subject, I, for one, would appreciate reading about them.

In our armamentarium we must decrease emphasis on the little black bag and devote more attention to our bulging brief-cases.

D. C. GEGGIE, M.D.

Wakefield, Que.

APPOINTMENT OF ROYAL COMMISSION
ON HEALTH SERVICES

To the Editor:

I note in a recent issue of *Hansard* (December 21, 1960, p. 1023) that in his letter to the Prime Minister, Dr. A. D. Kelly says: "I am therefore directed to request that there be established a royal commission, etc."

As a dues-paying member of the O.M.A. and, therefore, of the C.M.A., I wish to enquire "Who directed Dr. Kelly?" To my knowledge there has been no discussion of this action at Provincial level. Certainly, there has been no "direction" of which either members of Council or of the Board of Directors — much less general members of the O.M.A. — are aware. I presume that a similar state of ignorance obtains in all other divisions of the C.M.A. May we have clarification, please.

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The General Secretary replies:

In a representative and democratic organization such as The Canadian Medical Association, there must necessarily be delegation of authority. In the present instance the Executive Committee of The Canadian Medical Association acted for The Association with the full powers of the General Council as it is constitutionally authorized to do. In *Economic News and Views* published in the *Journal* of December 24 there is set out the sequence of events leading up to the decision of the Executive Committee to direct the General Secretary to request the appointment of a Royal Commission.

THE LONDON LETTER

GENETIC HAZARDS OF X-RAYS

The most extensive survey of radiation dosage to the gonads so far attempted anywhere in the world has recently been analyzed by a committee set up by the British Ministry of Health after some worrying reports of damage to gonads by diagnostic and therapeutic procedures had been received in 1956. This committee, chaired by Lord Adrian, deals in its present report exclusively with the threat to the gonads, and in particular with the threat posed by diagnostic procedures. It seems that the genetic dose administered to the population of Great Britain per year is now about 19 mr. of which 14 mr. comes from diagnostic radiology (it was calculated as at least 22 mr. in 1956, so radiologists are already taking steps to cut down the risk); this must be set against the inescapable dose from background radiation of 100 mr. annually.

The present survey involved 130 hospitals and 5400 patients, and revealed a wide variation in precautions taken from hospital to hospital. It seems that the gonads were in the beam in no less than 10% of chest radiographs on males, and in 51% on females. Obstetric examinations contributed about one-third of the dose, and x-rays of pelvis and femur another third. Only 10% of the therapeutic dose came from treatment of malignant disease.

The committee feels that the dose of 19 mr. could be reduced to 6 mr. by using more careful techniques, and considers that a few hospitals with faulty procedures contribute a great deal of the total genetic dose. Making the beam of x-rays more penetrating does not reduce the gonadal dose; the optimum is about 70 kV with a 1 mm. Al filter. They recommend use of light beam diaphragms, and gonad shields, image intensification, regular checking of apparatus, development of automatic devices, and abolition of radioscopy for detection of foreign bodies in favour of electronic metal-locating apparatus. A patient should always be questioned about previous x-ray exposures, and special precautions must be taken with any woman even potentially pregnant, for damage can be done before the woman is aware of her pregnancy.

DOCTORS' HOBBIES

Everyone is aware from the annual art salon in Canada that many doctors are addicted to painting in their spare time, but the wide range of doctors' hobbies is not such common knowledge. A stroll through the recent Benger Exhibition of Doctors' Hobbies staged in December at B.M.A. House, London, showed the remarkable versatility of our colleagues outside office hours. Undoubtedly the most astonishing object in the exhibition was a real two-seater airplane sitting out in the rain in the courtyard of the B.M.A. building, built by doctors and apparently quite capable of flying. Indeed we are informed that it was actually flown down from Scotland for the exhibition, although its wings had to be removed to get it past the memorial gates which separate the B.M.A. from the vulgar. The other exhibit which could not be hauled up the stairs to the exhibit hall was a beautiful boat which apparently em-

bodies a new principle of exploiting the energy created by its own bow wave. There was a fine model railroad for the eternal child in us, and a most lovely silver model of a 1934 Frazer-Nash car, while toy soldiers abounded, and there was even a model Canadian Pacific locomotive. Sculpture included a grotesque model of an unhappy prisoner trying to get out of his bars, and at the other extreme a carved lectern for children's services. The paintings ranged from Mediterranean harbours to "six stages in diverticulosis of the colon", with an odd picture of the staff of a hospital taking tea in the common room, served by an achondroplastic maid.

A useful gadget was a conversation clock for communicating with handicapped patients. The hands turned to various phrases such as "I want to sit up" or "please get me my newspaper" as the clock slowly moved on. One enterprising physician had collected 90 variations of his name appearing on envelopes addressed to him. His correct name of Kinmont had been distorted to such variations as "Miss H. M. Minnami" and "D. Hardy Turncoat". The stamps and letters exhibits had representatives of letters damaged by acid thrown into pillarboxes by our militant suffragette grandmothers, and one delivered by a sagacious dog with tooth marks to prove it. Perhaps the oddest collection was one of china models of shoes culled from the Victorian era, some of which were adorned with flowers and bore such inscriptions as "A present from Margaret". Were our Victorian ancestors fetishists, or did they just like china ornaments?

Perhaps the C.M.A. will one day give us a chance to see what inventive genius lurks inside the Canadian medical cerebrum.

NOISE IN THE HOSPITAL

A short stay in the average hospital will soon disabuse anyone of the idea that these institutions are havens of peace, and the old crack by Sir Robert Hutchison that "convalescent homes are only suitable for those with the most robust constitutions" is not without justification. King Edward's Hospital Fund has been carrying out a survey of noise in London and country hospitals, and makes a pathetic plea for quieting the places down a little. Oddly enough, the main source of complaint was about traffic noise outside the hospitals, and one thinks of the traditional straw put down outside the rich man's house in Victorian novels. Yet last week the BBC Brains Trust decided that the streets were no noisier than they had been before the advent of the motor car. Seventeen per cent of the complaints were about other patients, including that nuisance, the man who knows all about all the other patients and their complaints, and feels impelled to share his knowledge. Convalescents are particularly noisy, nurses talk too much and too loudly, and the noise of patients in distress adds to the din. Domestic staff rushing around with electrical devices or banging crockery about, or cheerfully calling to patients to wake them up (one shouted 29 times to patients in a 29-bed ward to know whether they wanted drinks) are obvious candidates for mayhem. One patient complained that the banging of beds by enthusiastic cleaners was worse

than any operation. Someone recently said that Britain is the only country where noise is not considered an amenity, but one would not think so after reading this report.

CUTTING THE DRUG BILL

When Mr. Enoch Powell was recently appointed Minister of Health, some apprehension was expressed because of his reputation as a money-saver, and sure enough he has not been long in getting to work to pinch the pennies. The nation's drug bill is now running at £75 million a year, and Mr. Powell has announced a new voluntary scheme for regulating drug prices, agreed between the government and the Association of British Pharmaceutical Industry. This replaces the old scheme which has just run for a trial period of three years, and in which prices paid by the government through the National Health Service were related to export prices of drugs. The situation is of course entirely different from that in Canada. The bulk of drugs

are sold on N.H.S. prescriptions, of which the patient pays only one shilling an item, the rest coming out of government funds (and thus finally from the taxpayer). In the new scheme the Ministry of Health may call for direct negotiations with manufacturers about prices on widely used drugs which are patent-protected and for which export prices may not be competitive. Also the percentage of sales of a product exported must be 25 if the export price is to be applied. A three-year period of freedom from control of prices of new products has been allowed up to now to enable the manufacturer to recover research and development expenditure, but this has now been removed from any new products which obviously owe nothing to research, such as mixtures of old friends. This is fair, and the drug manufacturers seem to be leaning over backwards to provide evidence of their good faith. They say that the wholesale price index for pharmaceuticals has risen since 1954 by only 1.01% as against 12.94% for all manufactured products. Incidentally the drug bill is 7% of the cost of the National Health Service.

S. S. B. GILDER

MEDICAL NEWS IN BRIEF

SOME DISEASES ASSOCIATED WITH PROTEIN MALNUTRITION, AS SEEN IN JAMAICA

Three nutritional diseases encountered in Jamaica, akee poisoning, veno-occlusive disease, and kwashiorkor, are described in a recent report by Taxay (*Gastroenterology*, 39: 173, 1960). Though not genetically determined, these diseases usually arise only if protein malnutrition exists. It is believed that pre-existing nutritional hepatic disease is a requirement for the occurrence of all three, certainly of veno-occlusive disease and kwashiorkor. Akee poisoning is due to ingestion of the unripe fruit of this name, which contains in its seeds 12 times as much hypoglycin A as does the ripe fruit. The toxicity of this polypeptide is enhanced by fasting. Hypoglycin A and hypoglycin B, both isolated from the seeds of the akee, cause marked hypoglycemia and glycogenolysis. Fatty metamorphosis of the liver, tissue edema and alimentary lymphoid hyperplasia are found in this disease. It usually occurs in colder months and is characterized by vomiting, retching, weakness and coma with diarrhea. In other patients, sudden foaming at the mouth, followed by fits and death without an intercritical phase, is observed. Liver biopsy may show complete absence of hepatic glycogen.

Veno-occlusive disease (VOD) is probably the chief reason for the high incidence of hepatomegaly found in children in Jamaica. It is believed that this form of liver disease is the main cause of infantile cirrhosis in Jamaica and in India. It has been encountered only in these two countries and in Egypt. It tends to occur in families, and when one child is found to be ill, hepatomegaly is usually found in the others. The onset of VOD is sudden, with ascites, hepatomegaly, edema

of the legs and, in severe cases, malaise and fever. There is no jaundice, the appetite is good and the children appear chubby although invariably underweight for their age. This acute form is common following an infection, such as whooping cough. Chronic VOD presents as portal obstruction and the picture is that of hepatic cirrhosis. The incidence of VOD is greatest in children under five years. In one series 236 children had livers more than 5 cm. below the costal margin and all had protein deficiency and substandard weights. It is significant that as far as treatment was concerned, a high protein diet was superior to all other therapeutic regimens.

Kwashiorkor is typically found in children 18 to 24 months of age who subsist on a diet of 400 to 700 calories, virtually free of animal protein. In this condition a fatty liver is the rule, although some patients do not exhibit this finding and there does not seem to be any relationship between the severity of the disease and the fat content of the liver. The pancreas is also involved, showing acinar atrophy, dilatation of the ducts and disappearance of the zymogen granules. These changes are also seen in parotid, lachrymal, and intestinal exocrine glands. When found in adults, the disease is essentially the same, although hepatic fibrosis and intestinal atrophy tend to be more marked. In addition, the problem of chronic infection or infestation adds to therapeutic difficulties. Mortality, even in hospital, is 10% to 35% among children. Optimal treatment consists of protein and caloric rehabilitation. Skimmed milk or casein is effective but refeeding must be gradual, otherwise the child may be made more ill. Pure albumin, protein hydrolysate, or blood infusions do not cure this disease.

(Continued on advertising page 28)

DOMINION INCOME TAX RETURNS BY MEMBERS OF THE MEDICAL PROFESSION

[We publish herewith the text of a memorandum approved by the Department of National Revenue for the guidance of doctors making income tax returns relative to the year 1960.]

As a matter of guidance to the medical profession and to bring about a greater uniformity in the data to be furnished to the Taxation Division of the Department of National Revenue in the annual Income Tax Returns to be filed, the following matters are set out:

Individuals whose income—(a) is derived from carrying on a business or profession (other than farming); (b) is derived from investments; or (c) is more than 25% derived from sources other than salary or wages, are required to pay their estimated tax by quarterly instalments during such year. Each payment must be sent in with Income Tax Instalment Remittance Form T7C. Any balance of Income Tax due is payable on or before the 30th April of the succeeding year, plus interest where applicable.

Doctors who pay salaries or wages to employees are required to deduct tax therefrom in accordance with the Table of Tax Deductions obtainable from District Taxation Offices. Each employee should complete and file one copy of form TD1 with his employer (a) at commencement of employment and (b) within seven days of any change in circumstances affecting his personal exemptions. If Form TD1 is not filed, tax deductions must be made as though the employee were a single person. Tax deductions withheld from salaries or wages must be sent to the local District Taxation Office not later than the 15th day of the following month accompanied by Tax Deduction Remittance Form TD7A.

The following timetable indicates the returns required:
A. Doctors NOT receiving salaries amounting to $\frac{3}{4}$ of income:

Date due	Forms to be used
March 31	Form T7C
April 30	Form T1 General
June 30	Form T7C
September 30	Form T7C
December 31	Form T7C

B. Doctors receiving salaries amounting to $\frac{3}{4}$ or more of income:

Date due	Forms to be used
April 30	Form T1 General (Note. Doctors whose earned income consists solely of salary and whose investment income is not over \$2,500 may use Form T1 Short unless they claim a capital cost allowance or a foreign tax credit.)

C. Doctors who pay salaries to their own employees:

Date due	Forms to be used
15th of each month	Form TD7A
February 28	Form T4 Summary and Supplementary

Details of the total salaries or wages paid to employees and the tax deducted therefrom must be forwarded to the local District Taxation Office on Forms T4 Summary and T4 Supplementary not later than the last day of February in each year.

INCOME

Under the provisions of the Income Tax Act a doctor is required to maintain an accurate record of all income received both as fees from his profession and by way of investment income. The record should be clear and capable of being readily checked against the return filed. It may be maintained on cards or in books kept for the purpose. Such records must not be destroyed until written permission for their disposal is obtained from the Minister of National Revenue.

EXPENSES

Under the heading of expenses, the following accounts should be maintained and records supported by vouchers kept available for checking purposes.

- Medical, surgical and like supplies.
- Salaries or wages paid to professional assistants, nurse, office help, bookkeeper. (It is to be noted that the Income Tax Act does not allow as a deduction a salary paid by a husband to a wife or vice versa. Such amount, if paid, is to be added back to the income.)
- Telephone expenses (long-distance charges on business calls and service charges for business telephones listed in the doctor's name, fees for telephone answering services).
- Assistants' fees; the names and addresses of the assistants to whom fees are paid should be furnished. This information is to be given each year on Income Tax form known as Form T4, obtainable from your District Income Tax Office.
- Rentals paid. The name and address of the owner (preferably) or agent of the rented premises should be furnished (see (i)).
- Postage and stationery.
- Depreciation or capital cost allowance as it is referred to in the Income Tax Act; a description of the treatment of depreciation may be found on page 4 of the Income Tax Return Form T1 General under Part XI Method, and the 1960 T1 General Information sheet.

The method of computing depreciation for tax purposes is the same as that used last year and you should have no difficulty if you have a copy of last year's return available.

Simply carry forward the balance remaining in each class after deducting last year's allowance. Add to this figure the cost of any new equipment purchased and deduct the proceeds from any disposal of property in each class. The rate you wish to use not exceeding the maximum rate (see below) is applied to the new balance for each class to obtain the depreciation you may claim this year.

The maximum rates for the classes of equipment used by doctors follow:

Capital item	Class	Annual maximum depreciation
Medical equipment:		
(a) Instruments costing over \$50 each and medical apparatus of every type	8	20%
(b) Instruments under \$50 each ..	12	100%
Office furniture and equipment	8	20%
Motor car	10	30%
Buildings of frame construction	6	10%
Buildings of brick construction	3	5%

Where a doctor practises from a house which he owns and resides in, the allowance may be claimed as above on a portion of the cost of the residence, excluding land. For example, if the residence were a brick building costing \$12,000 and one-third of the space were used for the office, the doctor would use \$4,000 as the business portion of the cost and apply the building rate of 5% to determine the maximum depreciation allowable in the first year.

For further information on the subject you may refer to the Income Tax Regulations or you may consult your District Taxation Office.

(h) Automobile expense (one car). This amount will include cost of licence, oil, gasoline, grease, insurance, garage charges and repairs.

Of the total expenses as above, there will be allowable only those incurred in earning the professional income, and if that car is used also for personal driving a proportionate amount of the total expenses should be excluded from the claim made for income tax purposes. "Personal driving" includes driving from home to office and vice versa.

Capital cost allowance may be claimed in respect of the car used in professional practice, but it is restricted to an allowance for that portion of the cost of the car that professional use is of total use.

No expenses or capital cost allowance may be claimed in respect of any car used wholly for personal driving.

(i) Proportional expenses of doctors practising from their residence.

- (a) owned by the doctor: where a doctor practises from a house which he owns and as well resides in, a proportionate allowance of house expenses will be given for the study, laboratory, office and waiting room space, on the basis that this space bears to the total space of the residence. The charges cover taxes, light, heat, insurance, repairs, capital cost allowance, and interest on mortgage (name and address of mortgagee to be stated).
- (b) rented by the doctor: only the rent and other expenses borne by the doctor such as heat and light will be apportioned inasmuch as the owner takes care of other expenses.

The doctor should be prepared to demonstrate, if called upon to do so, that this apportionment of any particular item is in accordance with the facts relative to that item.

- (j) Sundry expenses. These should cover only small items not otherwise classified; for example, laundry, malpractice insurance, etc. The expenses charged to this account should be capable of analysis and supported by records.

Claims for charitable donations should be made in the space provided for this item on the Income Tax forms and should not be included in the professional expenses. Such claims are allowable as a deduction from income up to 10% of the net income upon submission of receipts to your District Taxation Office.

Where donations made in 1959 exceeded 10% of the net income for that year, the excess may be claimed in 1960, but only to the extent that 10% of the net income for 1960 exceeds the donations made in 1960.

The annual dues paid to governing bodies under which authority to practise is issued and membership association fees, to be recorded on the return, will be admitted as a charge. Initiation fees and the cost of attending postgraduate courses will not be allowed.

- (k) Interest. Interest paid on borrowed money may or may not be charged as an expense according to the use made of the borrowed money. For example, if it was used to acquire an interest in a partnership or to buy professional equipment, the interest paid may be claimed as an expense in computing professional income, while if it was used to acquire securities or real property, the interest paid may be claimed as an expense in computing the income received from the securities or real property. On the other hand, interest paid on money borrowed for personal use may not be claimed as a deduction from any kind of income.
- (l) Business tax will be allowed as an expense, but Dominion, Provincial or Municipal income tax will not be allowed.
- (m) If no claim is made for charitable donations, association fees, or medical expenses, a deduction of \$100 is allowable.
- (n) Social club dues are allowable only when, and to the extent that, they are paid for business purposes, and any doctor claiming them may be required to prove, to the satisfaction of the taxation authorities, that the amount claimed was expended wholly and directly for the purpose of increasing his business income. "Social club dues" means annual or monthly membership dues or fees; it does not include an initiation or entrance fee or the cost of a share of a club's capital stock, nor does it include charges for food and drink, living accommodation, fees for the introduction of guests and the like.

CONVENTION EXPENSES

Under Section 11(i) (ia) of the Income Tax Act, convention expenses are allowable to an individual carrying on a business or practising a profession, but the allowance is restricted to the expense of attending no more than two conventions in a taxation year. Furthermore, the taxpayer's attendance at the convention must have been for business or professional reasons. There are no geographical restrictions and the convention, therefore, need not necessarily have been held in Canada.

As heretofore, the expenses to be allowed must be reasonable, and the taxpayer should show:

- (1) The dates on or between which the convention was held, and the location thereof;

- (2) The number of days he was present at the convention, supported by certificate of attendance from the sponsoring organization; and
- (3) The expenses incurred, segregating
 - (a) transportation expenses
 - (b) meals, and
 - (c) hotel expenses, for which at least vouchers should be obtained and kept available for inspection.

All expenses of a personal nature, including those attributable to the fact that the taxpayer's wife (or husband as the case may be) accompanied him to the convention, must be excluded from the foregoing.

No expenses for attending a convention are allowable as a deduction from salary income, since such a deduction is prohibited by Section 5 of the Act.

REGISTERED RETIREMENT SAVINGS PLANS

The amount that is deductible in respect of contributions to a retirement savings plan is limited:

- (a) in the case of an employee receiving a salary who is covered by a registered employer-employee pension plan, to the lesser of \$1,500 or 10% of his earned income minus, in each case, the amount of his deductible contributions for the year under that pension plan; and
- (b) in other cases to the lesser of \$2,500 or 10% of his earned income. "Earned income" usually consists of income received as salary (before any pension deductions) or income from carrying on a business or profession, plus net rental income.

The amounts deductible are those paid in 1960 and within 60 days after the end of the year. A payment made in January or February of 1961 cannot be claimed in 1961 if it could have been deducted in 1960.

Individuals enquiring whether a proposed or existing plan is acceptable should usually request that information from the corporation offering the plan, as it will normally be the corporation's responsibility to explain the plan and get it registered.

Doctors who have applied for membership in the Canadian Medical Retirement Savings Plan not later than February 9, 1961, may be assured that their names are registered as participants in a registered retirement savings plan and that their contributions are deductible for the taxation year 1960 to the extent outlined above. The closing date of February 9, 1961, has been established by arrangement with the Bank of Montreal for C.M.R.S.P. contributions applicable to 1960. Certificates showing the amount of contributions will be mailed to C.M.R.S.P. members in March 1961, to support claims made for deductions in their 1960 income tax returns.

Applications for membership in C.M.R.S.P. and contributions received after February 9, 1961, will entitle participants to tax deferral for 1961.

PROFESSIONAL MEN UNDER SALARY CONTRACT

The Income Tax Act provides that income from an office or employment is liable to tax without deductions of any kind except such as are specifically provided for in the Act. The allowable deductions include the employee's contributions to a pension fund, alimony, travelling expenses, annual professional membership dues, office rent, salary to an assistant or substitute, supplies consumed directly in the performance of the duties of employment and amounts paid into a retirement savings plan.

Section 11 (10) (a) of the Income Tax Act permits the deduction from income of an office or employment of annual professional membership dues only if their payment was "necessary to maintain a professional status recognized by statute".

The annual registration fee of the provincial medical licensing authority would be allowable if paid by the doctor himself.

Certain conditions are attached to the allowance of the expenses, and without trying to recite the exact provisions of the law, it may be said the main points are that:

- (a) The expenses must have been incurred in the performance of the duties of the office or employment.
- (b) The employee is required, under the contract of employment, to pay the expenses.

(Continued on page 180)



Regularity and Metamucil

Both are basic for relief and correction of constipation

Effective relief and correction of constipation require more than clearing the bowel. Basic to the actual correction of the condition itself is the establishment of regular bowel habits. Equally basic is Metamucil which adds a soft, inert bulk to the bowel contents to stimulate normal peristalsis and also to retain water within stools to keep them soft and easy to pass. Thus Metamucil induces natural elimination and promotes regularity.

Metamucil

brand of psyllium hydrophilic mucilloid

G. D. **SEARLE** & Co.
of Canada, Ltd.
Brampton, Ontario

Canadian Medical Retirement Savings Plan

ONE PLAN — TWO METHODS OF SAVING

C.M.R.S.P. is a savings arrangement, established by The Canadian Medical Association and registered with the Government, providing facilities for the purchase of retirement annuities on a group basis by tax exempt contributions.

Since the adequacy of your retirement income depends both on the amount you are willing to save and the purchasing power of the dollar, two methods of saving are made available:

1. An insured annuity plan, underwritten by The National Life Assurance Company of Canada, incorporating long-term guarantees in addition to participation in the profits of the insurer.

2. A common stock investment plan, managed by The Royal Trust Company, which translates your contributions into common shares in leading companies allowing you to participate in the growth of the Canadian economy.

JOIN NOW

If you have not previously applied, it is necessary that you forward a completed application card (see opposite page) to the C.M.A. office prior to February 9, 1961, in order that we may register your contract for 1960 tax relief.

TAX SAVINGS

The table below shows the federal income tax savings which would accrue to a participant contributing the maximum amount permitted by legislation — 10% of net earned income or \$2500 whichever is the lesser (assuming \$2500 personal deductions). In addition, Quebec residents may now claim such contributions as exemptions for provincial income tax purposes.

Earned Income	Tax Applicable	Tax Exempt Retirement Savings Allowance	Tax Payable	Tax Savings
\$ 8,000	\$ 1,030	\$ 800	\$ 854	\$ 176
10,000	1,530	1,000	1,270	260
12,500	2,260	1,250	1,885	375
15,000	3,160	1,500	2,610	550
20,000	5,285	2,000	4,385	900
25,000	7,535	2,500	6,410	1,125
35,000	12,410	2,500	11,160	1,250

Based upon total personal exemption of \$2500.

MAXIMUM FLEXIBILITY

Contributions may vary from year to year but may not be less than \$300 per year or more than the maximum permitted by legislation. Complete flexibility is provided within these limits and each member may direct his contributions to each element of the Plan in any desired proportion.

(Maintenance of insured annuity plan guarantees requires a \$100 per year minimum contribution to this plan.)

OUR PERFORMANCE

The response of our members has been most encouraging. In the first contribution year (September 1, 1957 — February 28, 1958) almost 1800 doctors applied for registration. Now, after three years' operation, we have 2500 participants who have invested more than \$8,200,000.

INVESTMENT RESULTS

The following tables show the investment results to date. While similar results cannot be guaranteed for the future, they indicate the care and attention which these investments receive.

INSURED ANNUITY PLAN

Contract Year Ending	Guaranteed Interest Rate	Dividend	Total Rate Credited
February 28, 1958	3½%	¾%	4¼%
February 28, 1959	3½%	1%	4½%
February 29, 1960	3½%	1%	4½%
February 28, 1961	3½%	1¼%	4¾%

COMMON STOCK PLAN

Date	Unit Value
December, 1957	\$10.00
June 1, 1958	10.40
December 1, 1958	11.82
June 1, 1959	13.02
December 1, 1959	12.58
June 1, 1960	12.36
December 1, 1960	12.33

For a listing of current holdings see page 179.

WITHDRAWAL BENEFITS

The purpose of C.M.R.S.P. is the encouragement of savings to provide retirement income in accordance with legislation. The contracts and agreements negotiated in connection with the Plan only provide for payment in the form of death or annuity benefits. However, in cases where members of the C.M.R.S.P. have applied to have their contracts amended so that they can withdraw contributions, liberal withdrawal benefits have been paid, subject to applicable tax (minimum 25%).

JOIN NOW — YOU CAN'T MAKE A BETTER INVESTMENT

The flexibility and economics associated with group purchasing power inherent in C.M.R.S.P. have not been seriously challenged by any competing proposal, whether insured or trustee. Join now by completing the application card on the opposite page or, if you require more information, write to The Canadian Medical Association, 150 St. George Street, Toronto, Ontario.

Application for Participation in

THE CANADIAN MEDICAL RETIREMENT SAVINGS PLAN

I hereby apply for participation in the Canadian Medical Retirement Savings Plan, the provisions of which are familiar to me. I understand that such participation entitles me to membership in certain Retirement Savings Plans, arranged with The National Life Assurance Company of Canada and The Royal Trust Company, and my application for such membership is indicated by my request that contributions be allocated to such Plan or Plans. I request that the instruments evidencing the terms of such membership be registered as Retirement Savings Plans under the Income Tax Act (Canada). I understand that as a consequence of such registration payments out of the Plans can only be made in the form of a life-contingency annuity or as a death benefit and that such payments to me or to my beneficiaries, executors or legal representatives will be subject to tax under the provisions of the Income Tax Act of Canada.

I understand that I am required to make payments into C.M.R.S.P. on a regular basis of at least \$300 yearly, and I request that per cent of these future payments be apportioned to my account in the Insured Annuity Retirement Savings Plan, underwritten by The National Life Assurance Company of Canada, and that the remainder of such future payments be apportioned to the Common Stock Retirement Savings Plan, managed by The Royal Trust Company, and be commingled therein with the payments made by other members. I understand that this percentage allocation may subsequently be varied by written notice in accordance with the provisions of C.M.R.S.P.

I undertake, upon request, to provide proof of age satisfactory to the issuer of any annuity contracts provided to me as a benefit under these Plans.

I hereby appoint The Canadian Medical Association to act as my Agent in the negotiation of contracts and agreements to carry out the provisions of C.M.R.S.P. and through the Association, I grant discretionary investment power to the managers of the Common Stock Retirement Savings Plan.

DATE..... SIGNATURE.....

WITNESS.....

Read and complete details listed below and return to—

THE CANADIAN MEDICAL ASSOCIATION - - - 150 St. George St., Toronto, Ont.

PLEASE PRINT OR TYPE REQUIRED INFORMATION

NAME.....
SURNAME..... COMPLETE CHRISTIAN NAMES.....

ADDRESS.....
STREET AND NO. CITY OR TOWN PROVINCE

DATE OF BIRTH..... SEX.....
DAY MONTH YEAR

CONTRIBUTIONS— ☐ Regular payments through your local branch of the Bank of Montreal.....

Check (✓) ☐ Payment to the Bank of Montreal of certain regular amounts to be charged to your account in a branch of another bank.....
method of payment

NAME OF YOUR BANK BRANCH CITY OR TOWN

Each contribution year ends on the ninth day of the month of February. All contributions made during each yearly period—February 10th to February 9th—are classified for tax purposes as contributions made during the calendar year which ends during this specific period. Thus, contributions made prior to the ninth day of February, 1961 are considered to be 1960 contributions. In order to so qualify, your contributions must be deposited in a branch of the Bank of Montreal on or prior to February 9th, 1961.

Each contribution will be acknowledged by the Bank of Montreal by an entry in a special pass-book. Each year you will receive a statement of accumulated contributions and a certificate for income tax purposes.

DEATH BENEFITS—

Benefits payable after your death will be paid to your executors or legal representatives. You may, however, indicate below the name of a beneficiary to receive that portion of any such benefits which arises out of your participation in the Insured Annuity Retirement Savings Plan.

BENEFICIARY'S NAME.....
SURNAME..... CHRISTIAN NAMES.....

ADDRESS.....
STREET AND NO. CITY OR TOWN PROVINCE

RELATIONSHIP TO YOU.....

DATE..... YOUR SIGNATURE.....

WITNESS.....

Demande de participation au

FONDS DE RETRAITE DES MÉDECINS DU CANADA

J'ai dûment pris connaissance de toutes les dispositions du fonds de retraite des médecins du Canada et je demande par les présentes d'être admis à y participer. Il est convenu que cette participation me donnera droit aux privilèges de membre de certaines caisses d'épargne établies par The National Life Assurance Company of Canada et The Royal Trust Company. Aux fins d'appuyer la présente demande de participation, je désire que mes contributions soient versées à l'une ou l'autre de ces caisses, ou aux deux. Je désire également que tout document attestant ma participation soit enregistré à titre de plan d'épargne-retraite conformément à la Loi canadienne de l'impôt sur le revenu. Il est convenu que par suite de cet enregistrement, tous versements provenant de ces caisses ne pourront être faits que sous forme de rente viagère ou de capital-décès, et que les sommes ainsi versées, à moi ou à mes bénéficiaires, exécuteurs ou représentants légaux tomberont sous le coup de la Loi canadienne de l'impôt sur le revenu.

Il est convenu que je m'engage à contribuer périodiquement au fonds de retraite des médecins du Canada une somme annuelle d'au moins \$300. Je désire que pour cent de ces versements à venir soient déposés, pour mon compte, à la caisse destinée à acheter une rente assurée souscrite par The National Life Assurance Company of Canada, et que le solde de ces versements à venir soit porté à la caisse d'épargne constituée d'actions ordinaires, administrée par The Royal Trust Company, et réuni dans cette caisse avec les versements faits par les autres membres. Il est entendu que le pourcentage ci-dessus pourra être modifié à l'avenir par une notification écrite, conformément aux dispositions du fonds de retraite des médecins du Canada.

Je m'engage à fournir sur demande une preuve satisfaisante de mon âge à la compagnie qui me délivrera tout contrat de rente dont je bénéficierai en vertu de ces caisses d'épargne.

J'autorise par les présentes l'Association médicale canadienne à me représenter dans la négociation des ententes et contrats nécessaires à l'exécution des dispositions du fonds de retraite des médecins du Canada et, par l'entremise de l'Association, je laisse tout investissement à la discrétion des administrateurs de la caisse d'épargne constituée d'actions ordinaires.

DATE..... SIGNATURE.....

TEMOIN.....

Lire et compléter la forme ci-dessous et nous la retourner à :

L'ASSOCIATION MEDICALE CANADIENNE - 150, St. George St., Toronto 5, Ont.

ECRIRE A LA MACHINE OU EN LETTRES MOULEES

NOM.....

NOM DE FAMILLE

PRENOMS AU COMPLET

ADRESSE.....

RUE ET NO

VILLE

PROVINCE

DATE DE NAISSANCE.....

JOUR

MOIS

ANNEE

SEXE

CONTRIBUTIONS—

☐ Versements périodiques à la Banque de Montréal.....

SUCCURSALE

VILLE

Indiquer (✓) la méthode de paiement

☐ Paiement à la Banque de Montréal de certains montants à être débités périodiquement à votre compte dans une autre banque.

NOM DE VOTRE BANQUE

SUCCURSALE

VILLE

Chaque année de participation prend fin le 9 février. Toutes les contributions versées chaque année—du 10 février au 9 février—sont classées, pour fins d'impôt, comme contributions effectuées au cours de l'année civile prenant fin durant cette période. Ainsi, les contributions faites avant le 9 février 1961 s'appliqueront à l'année 1960. Pour qu'elles soient ainsi applicables à l'année 1960, elles devront avoir été déposées à l'une des succursales de la Banque de Montréal le 9 février 1961 au plus tard.

Toute contribution sera inscrite par la Banque de Montréal dans un carnet spécial. Vous recevrez chaque année un relevé indiquant le montant des contributions accumulées, ainsi qu'un certificat pour les fins de l'impôt sur le revenu.

CAPITAL-DECES

Le montant payable après votre mort sera versé à vos exécuteurs testamentaires ou représentants légaux. Vous pouvez, toutefois, inscrire ci-dessous le nom d'un bénéficiaire qui recevra la portion du capital découlant de votre participation à la caisse d'épargne destinée à acheter une rente assurée.

NOM DU BENEFICIAIRE.....

NOM

PRENOMS

ADRESSE.....

RUE ET NO

VILLE

PROVINCE

LIEN DE PARENTE.....

DATE..... VOTRE SIGNATURE.....

TEMOIN.....

THE CANADIAN MEDICAL RETIREMENT SAVINGS PLAN

COMMON STOCK FUND

SCHEDULE OF ASSETS HELD SHOWING MARKET VALUE AT NOV. 30TH, 1960

CANADIAN STOCKS

No. of Shares	Description	Value
375	Ford Motor of Can. Ltd.	\$ 48,000.00
4100	Bank of Montreal	223,450.00
2000	Banque Can. Nat.	102,500.00
3100	Bank of Commerce	168,950.00
2400	Royal Bank of Canada	162,600.00
1900	Toronto-Dominion Bank	107,112.50
3500	Hiram-Walker G. & W.	135,187.50
3600	Cdn. Breweries Ltd.	148,500.00
3200	Molson's Brewery Ltd. "A"	76,000.00
1500	Building Products Ltd.	49,500.00
4500	Dominion Tar & Chemical	61,875.00
2000	Canadian Industries Ltd.	28,000.00
270	Confederation Life Asscn.	44,550.00
120	Manufacturers Life Insur. Co. ..	30,720.00
2700	Algoma Steel Corp. Ltd.	82,350.00
2150	Steel Co. of Canada Ltd.	131,150.00
4300	Loblaw Companies "A"	120,400.00
400	Loblaw Companies "B"	12,200.00
2700	Simpsons Limited	72,900.00
4000	Woodward Stores Ltd. "A"	57,000.00
1050	Asbestos Corporation Ltd.	26,512.50
3800	Aluminum Limited	113,050.00
3300	Hollinger Cons. Gold Mines ...	65,587.50
2400	International Nickel of Can. ...	131,700.00
2000	Consolidated M. & S.	40,000.00
4600	Moore Corp.	216,200.00
430	Goodyear Tire & Rubber, Can. .	53,750.00
2000	B.A. Oil Co. Ltd.	54,500.00
1900	Imperial Oil	66,262.50
1300	Texaco Can.	73,450.00
2400	Hudson Bay Oil & Gas	21,720.00
3100	Abitibi Power & Paper Co.	114,312.50
2700	Consolidated Paper Corp.	107,325.00
3100	Great Lakes Paper Co. Ltd.	118,575.00
5000	Macmillan Bloedel & P.R. Ltd. .	75,000.00

CANADIAN STOCKS—(Continued)

No. of Shares	Description	Value
3100	Interprov. Pipe Line Co.	184,837.50
1300	Trans Canada Pipe Lines Ltd. .	23,725.00
2800	Alberta Gas Trunk Lines	66,150.00
6200	Calgary Power Ltd.	141,825.00
4500	Shawinigan Water & Power	115,312.50
11,100	Consumers Gas Co.	160,950.00
7500	Union Gas Co. of Can. Ltd. ..	112,500.00
1750	Bell Tel. Co. of Canada	82,031.25

Total Canadian Stocks \$4,028,221.25

UNITED STATES STOCKS

1479	Dow Chemical Co.	\$ 107,952.21
600	E. I. Dupont de Nemours	107,694.00
2000	General Electric Co.	146,720.00
2150	Insurance Co. of N.A.	145,641.00
500	I.B.M. Co.	272,410.00
1150	Owens Illinois Glass Co.	98,428.50
700	General Foods	46,214.00
550	Minneapolis-Honeywell Reg. ...	70,878.50
700	Minnesota Mining & Mfg.	46,816.00
2000	Standard Oil of N.J.	75,080.00

Total U.S. Stocks \$1,117,834.21

INTERNATIONAL STOCKS

2800	Royal Dutch Petroleum.	\$ 87,976.00
------	-----------------------------	--------------

Total Securities \$5,234,031.46

Cash earning daily interest \$ 6,430.04

Market Value of Fund \$5,240,461.50

INCOME TAX RETURNS

(Continued from page 174)

- (c) To claim travelling expenses the employee must be ordinarily required to carry on the duties of his employment away from his employer's place of business. Travelling between the doctor's home and his office is not included.

Where travelling expenses are allowable under these provisions, depreciation may be claimed on the automobile

used for this purpose, but no other claim for depreciation may be made.

INCOME FROM A PARTNERSHIP

Additional expenses incurred by a partner, but not charged to the partnership, may be claimed as a deduction from the partner's share of income. However, the partner must be in a position to substantiate these expenses, to show why they were not charged directly to the partnership and that they were necessarily laid out to earn the partnership income.

BOOK REVIEWS

ENDODONTICS. The Postgraduate Dental Lecture Series. Harry J. Healey. 351 pp. Illust. The C. V. Mosby Co., St. Louis, Mo. 1960. \$7.75.

This new textbook emphasizes the increasing importance of endodontia in the practice of dentistry. The author, fully cognizant of the fact that the practice of endodontia is far more than a technique, places great emphasis on diagnosis and selection of cases for endodontic treatment. The opening sections of the text also deal most adequately with the close bearing of the basic sciences in the practice of endodontia.

In the chapter on "Treatment Objectives and Procedures", the author stresses the importance of the histology of the normal pulp and the histopathology of the periapical lesions to facilitate more rational application of endodontics. The chapter on rubber dam seems very elementary and is somewhat lengthy but would be valuable reading for the undergraduate or graduate who is not too familiar with endodontic technique.

In the chapter "Canal Instrumentation" the author wisely discusses the great importance of the thorough cleansing of the root canal of all pulp debris before drug therapy is commenced. Included in this chapter also are sound instructions on the microbiologic culture testing for asepsis.

Dentistry is becoming more acutely aware of the necessity for premedication and other systemic drug therapy, and this reviewer was delighted and surprised to find such a long and comprehensive chapter on the writing of prescriptions and systemic medication.

In the chapter "Surgical Intervention Associated with Endodontic Therapy", the author rightly condemns routine root resections and periapical surgery regardless of intracanal or apical condition. However, his discussion of surgical technique where indicated is clearly set out and well illustrated. In contrast, his information in other parts of the text on non-surgical technique is most timely, giving the reader a better understanding regarding the treatment of extensive areas of bone destruction and repair which were once thought impossible to treat by conservative means.

The chapter devoted to the restoration of the treated pulpless tooth is most valuable, not only to the general practitioner but also to the endodontist who does no restorative dentistry. There are many occasions when the endodontist must consult the referring dentist with regard to the nature of the final restoration.

In the opinion of this reviewer, one of the most important chapters is the "Management of Fractured Anterior Teeth in Children". A full description of the

various types of injuries is set out in this chapter. Emphasis is placed on the great responsibility of the dentist to manage such injuries quickly and skilfully.

The field of endodontia has a great number of outstanding research teachers and authors, and this most recent text of Harry J. Healey is a refreshing and up-to-date addition to dental endodontic literature.

THE EARLY HISTORY OF SURGERY. W. J. Bishop. 192 pp. Illust. Robert Hale Limited, London, 1960. 18s. net.

This very readable history represents a tremendous amount of knowledge which has been compressed into one rather small book without losing sight of salient facts.

The story of surgery is told from the dawn of history, epoch by epoch, to post-Listerian times.

At the end of each chapter a short bibliography is given, should one wish to enlarge on the incidents described in that particular chapter.

The volume can be unconditionally recommended to all those of the laity, or of the profession, who are interested in the story of the development of surgery.

A DOCTOR'S MEMOIRS. A. I. Willinsky. 183 pp. The Macmillan Company of Canada Limited, Toronto, 1960. \$4.75.

This book will find a place in the library of sociologists where it will serve as a primary record of the social revolution that occurred in Canada during the first half of the twentieth century. It is the autobiography of an intelligent medical man, who, coming from a despised minority group, was viewed with suspicion by his colleagues. In spite of his rejection he continued to work carefully and explore new ideas. Ultimately he received a hospital appointment. This story is portrayed against the changing background of the "foreign" community of Toronto. As a boy he experienced overt racial prejudice, yet lived to see the minority groups accepted and making a contribution to Toronto's cosmopolitan culture.

The text is written in a clear yet intimate style. The author has permitted his personality to permeate the text, so that the reader willingly forgives the minor errors of sequence and time that the author in his preface attributes to the vagaries of memory produced by many years of a busy medical practice.

The volume itself is a fine example of the book designer's art. The type face is clear and the paper opaque. The margins appear narrow, but this permits a smaller, lighter volume, eminently suitable for reading in bed.

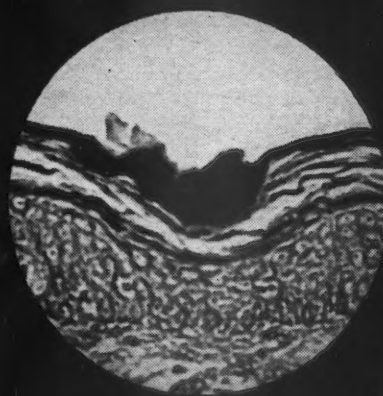
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1. Spoor, H. J.: New York St. J. M. 60:2863, 1960.
2. Wiese, H. F., et al.: J. Nutrition 66:345, 1958.
3. Smith, L. W., et al.: Amer. J. Med. Sc. 237:600, 1959.
4. Nutrition Reviews 17:136, 1959.

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MEDICAL NEWS in brief*(Continued from page 172)***CHEST PHYSICIANS
ESTABLISH FUND TO
ASSIST CUBAN MEMBERS**

At the meeting of the Board of Regents of the American College of Chest Physicians held in Washington, D.C., on November 28, 1960, a resolution was adopted to establish a relief fund for Cuban members of the College who have been exiled temporarily from their country. The Board of Regents voted to contribute \$5000 to launch the fund and contributions are being solicited from College members and others who are interested. The Cuban Chapter of the College was founded in 1940 and now has 74 members.

**ASSOCIATION OF
RADIOLOGISTS OF THE
PROVINCE OF QUEBEC**

At a meeting held on November 26, 1960, the Association of Radiologists of the Province of Quebec elected the following executive officers and directors for the forthcoming year: President, Dr. Jean Bouchard, Royal Victoria Hospital, Montreal; Vice-President, Dr. J. S. Dunbar, Montreal Children's Hospital; Secretary, Dr. O. Raymond, Hôpital du Sacré-Cœur, Montreal; Treasurer, Dr. L. I. Vallée, Hôpital St-Luc, Montreal; Directors: Dr. R. L. Duberger, Hôpital St-Vincent-de-Paul, Sherbrooke; Dr. R. G. Fraser, Royal Victoria Hospital, Montreal; Dr. H. Lapointe, Hôpital de l'Enfant-Jésus, Quebec; Dr. M. Samson, Hôpital St-Michel-Archange, Quebec, and Dr. I. Sedlezky, Montreal Jewish Hospital, Montreal.

**CHEST DISEASE ISSUE OF
L'UNION MEDICALE**

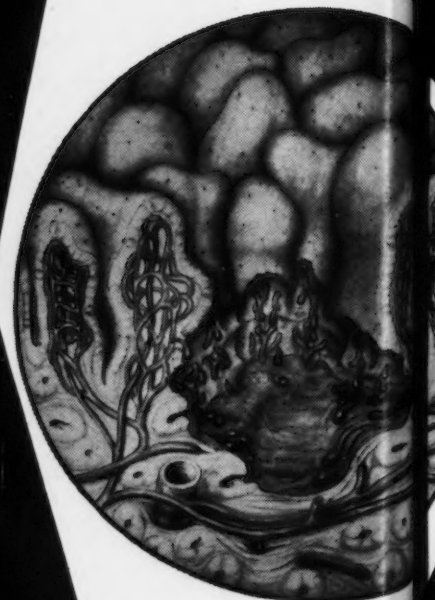
The September 1960 issue of *L'Union Médicale du Canada* is devoted to diseases of the chest with papers by the staff of the Sacré-Cœur Hospital, Montreal. Tuberculosis, collapse therapy and surgery of tuberculosis, and tuberculous pleurisy in infants are discussed. The editorial deals with antibiotic therapy and poses the

question whether antibiotics have solved the problem of tuberculosis. There are papers on pulmonary infection and diabetes, the value of radiology in acute pulmonary infections, pneumonectomy and malignant tumours of the pleura. Bronchoscopy and its value in detecting pulmonary lesions, and pulmonary mycosis and *Staphylococcus pyogenes* infections, are additional subjects covered in this issue.

**RESEARCH IN ACCIDENT
PREVENTION**

In 1959, the Metropolitan Life Insurance Company offered an award of \$1000 for research judged to make the most significant contribution toward reducing the toll of accidental injury and death. The responsibility for administering the award was accepted by the National Safety Council, which entrusted the task of selecting the winner to

strengthens
fragile capillaries
in
internal
bleeding



capillary hemorrhage
in duodenal ulcer

... associated with abnormal capillary
permeability and fragility in

peptic ulcer
ulcerative colitis
chronic nosebleed
purpura
(nonthrombocytopenic)
hemorrhagic cystitis
ecchymoses
menorrhagia
habitual and
threatened abortion

its Committee on Research and Education.

The purpose of the award was to give recognition and encouragement to investigators now working in the field of safety, and to induce scientists engaged in other areas of research—physical, biological, or social—to include in their studies the problem of accident prevention. The magnitude of the social and economic losses resulting from accidents is underscored by the fact

that they take more than 90,000 lives a year in the United States; at least 100 times that number of people annually are injured severely enough to be disabled one or more full days beyond the day of accident. In 1959, the Metropolitan Life Insurance Company alone paid no less than \$50,500,000 in death claims on policyholders killed in accidents; more than half this total was disbursed on account of deaths in motor vehicle accidents.

While the prime objective of the Company's award is to reduce the heavy toll of suffering and death, the economic facts alone would justify any effort to stimulate further study of the causes and prevention of accidents. Moreover, the factors responsible for accidents can be determined more readily than those for other major causes of death—such as the cardiovascular diseases and cancer—but the task requires research.

The first Metropolitan Life Award for Research in Accident Prevention was presented to Dr. B. J. Campbell, now Assistant to the Director of the Automotive Crash Injury Research Project at Cornell University, for his study "Driver Improvement: The Point System." The research project, conducted at the University of North Carolina, was sponsored by the American Association of Motor Vehicle Administrators and financed by the Esso Safety Foundation.

The point system is a method of selecting drivers whose driving behaviour needs to be improved. When a driver is convicted of a traffic violation his record is charged with a certain number of points, depending upon the seriousness of the offence. If he accumulates a specified number of points in a given period, the State takes some action in an attempt to improve his driving. The action may consist of a warning letter, an interview, probation, or licence suspension.

Dr. Campbell's study showed that drivers who had committed traffic violations not involving accidents are more likely to have accidents than those without violations. In this part of the study, the records of more than 40,000 randomly selected drivers in North Carolina were analyzed.

Dr. Campbell found also that the point system was effective in improving driver behaviour. Analysis of the records of more than 14,000 drivers licensed in New Jersey showed that drivers who received corrective action in connection with the point system had fewer subsequent violations than a comparable group of drivers who received no penalty. Furthermore, the records of the minority of drivers who committed violations

(Continued on page 32)

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(double strength CVP)

water-soluble citrus bioflavonoid
compound (200 mg.) with ascorbic acid
(200 mg.), per capsule

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for unvarying potency, purity, and efficacy from dose to dose • CHLOROMYCETIN Palmitate
—for children and adults who prefer a liquid medication—an easy-to-give, easy-to-take
custard-flavoured suspension. **parenteral** CHLOROMYCETIN Succinate—
so versatile it can be given intramuscularly, intravenously, or subcutaneously.

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ophthalmic CHLOROMYCETIN Ophthalmic Ointment

and CHLOROMYCETIN Ophthalmic Solution for notable efficacy...ready penetration

into ocular tissues. **topical** CHLOROMYCETIN Cream, 1%

for rapid clearing of superficial skin infections and surgical wound infections—
all important members of a distinguished family

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The numerous dosage forms of CHLOROMYCETIN—designed to meet virtually every type of clinical application—offer the physician the added convenience of flexibility of dosage and administration according to the requirements of the patient.

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FOR EVERY TYPE
OF CLINICAL
APPLICATION**

(chloramphenicol, Parke-Davis)

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References: (1) Ehrlich, J., *et al.*: *Science* 106:417, 1947. (2) Woodward, T. E., *et al.*: *Ann. Int. Med.* 29:131, 1948. (3) Smadel, J. E.: *Am. J. Med.* 7:671, 1949. (4) Parker, R. T., *et al.*: *J.A.M.A.* 143:7, 1950. (5) Lewis, R. S., & Gray, J. D.: *Brit. M. J.* 2:939, 1951. (6) Trice, E. R., & Shafer, J. C.: *J.A.M.A.* 149:1469, 1952. (7) Robinson, H. M., Jr., *et al.*: *Bull. School Med. Univ. Maryland* 38:109, 1953. (8) Roper, K. L.: *Indust. Med.* 23:50, 1954. (9) Costner, A. N.: *South. M. J.* 48:1192, 1955. (10) Deacon, W. E., *et al.*: *Antibiotic Med.* 2:143, 1956. (11) Josephson, J. E., & Butler, R. W.: *Canad. M.A.J.* 77:567, 1957. (12) Blair, J. E., & Carr, M.: *J.A.M.A.* 166:1192, 1958. (13) Goodier, T. E. W., & Perry, W. R.: *Lancet* 1:356, 1959. (14) Rebhan, A. W., & Edwards, H. E.: *Canad. M.A.J.* 82:513, 1960.

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MEDICAL NEWS in brief (Continued from page 29)

after action was taken against them showed that those against whom corrective action had been taken waited a longer time before committing their next violation than did those who were not penalized; the violations subsequent to action appeared to be less serious than those committed earlier.—*Statistical Bulletin*, Metropolitan Life Insurance Company, October 1960.

AMYLOIDOSIS AND RENAL CANCER

As the major chronic suppurative infections have become controlled by antibiotic treatment, amyloid disease as it has been known for many decades has practically disappeared. Various other conditions have been found to be associated with amyloid disease, such as Hodgkin's disease, multiple myeloma and hyperglobulinemia.

Piccard *et al.* (*Presse méd.*, 68: 1541, 1960) report in an anatomo-

micro-clinical study the association of amyloidosis of the liver and spleen with cancer of the kidney. They stress the plasmocytic infiltration of the spleen with amyloid deposits and the involvement of the reticulum of the liver and spleen, and point to the significant frequency of renal epithelium among the malignant amyloid-forming tumours.

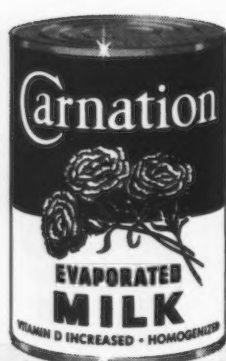
THE FIGHT AGAINST TUBERCULOSIS

The need for a continued fight against tuberculosis is stressed by Vidal (*Union méd. Canada*, 89: 1105, 1960), who has been active in this field for nearly half a century. He emphasizes the danger of the attitude prevailing at present that tuberculosis has been conquered. Although mortality rates from tuberculosis have greatly diminished in the Province of Quebec, the morbidity has not declined to the same extent. Men are apparently more prone to develop tuberculosis than women, and mortality is higher in the older age group, 40 to 50, whereas some 30 years ago it involved primarily the younger people. Comparing the statistics of Ontario and Quebec, it is obvious that Quebec has the less satisfactory advance in the fight against this disease. The various reasons are pointed out which make it paramount to continue an active fight against tuberculosis by education of the public, more adequate methods of detection and control, and systematic observation of tuberculous patients after discharge from sanatorium or when treated at home.

MULTIPLE SCLEROSIS IN THE SOVIET UNION

A study of 5278 patients with disseminated sclerosis, treated in 30 institutions in the Soviet Union from 1948 to 1957, shows marked differences in the incidence of the disease in various areas of the country. A higher incidence is reported by Grashchenkov, Rogover, Gekht and Vein in the north and northwest as compared to that for the south and southeast (*Klinicheskaya Meditsina*, No. 9: 6, 1960). Of the coastal cities, Riga, on the Baltic, and Archangel, on the White Sea, have the highest percentage of patients, whilst

(Continued on page 37)



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The finest forms of milk for bottle feeding



MEDICAL NEWS in brief
(Continued from page 32)

Odessa, on the Black Sea, has less, and Baku, on the Caspian, and Sochi, on the Black Sea, have the lowest incidence.

Comparing the percentage of patients with disseminated sclerosis in the period 1948 to 1952 and that of 1953 to 1957, there was practically the same number. The authors believe that there has not been an increase in the incidence of disseminated sclerosis in the Soviet Union in recent years. There was no significant sex difference, but a considerably higher number of patients in the 40 to 60 age group were found than is normally reported in the medical literature.

Studies of this type should be continued in order to understand better the pathogenesis of this disease and the environmental influences, including infection and allergic factors, in the various geographical zones.

GASTRODUODENAL ULCER
AND PULMONARY
EMPHYSEMA

For the past eight years or more, a relationship has been reported from various quarters between pulmonary emphysema and an increased susceptibility to gastroduodenal ulcer. Hegetschweiler, Hunziker and Maranta (*Schweiz. med. Wchnschr.*, 90: 1012, 1960) reviewed the literature and found some reports showing that whilst autopsy material among the general population revealed an ulcer incidence of 6.4%, patients with emphysema had an associated ulcer in 19% of cases. After reviewing their total hospital population for the years 1958 and 1959, consisting of 6077 patients, they found a significant increase in ulcer incidence among male patients with emphysema compared to the ulcer incidence in the general male population (10.4% as against 6.4%). On the other hand, there was no such relationship in their female patients with emphysema. The authors' criteria for diagnosis of peptic ulcer may be stricter than those of other centres. They consider that smoking may be a factor of significance in the pathogenesis of emphysema and possibly of peptic ulcer as well. They found no other exogenous factors which

they considered to be of etiological significance. On the other hand, endogenous factors, such as the personality of the asthmatic and ulcer patients, may be related, as both conditions are considered classic examples of psychosomatic diseases. They also mention the relationship between mucoviscidosis and the increased tendency to gastric ulcer. According to Koch, a not inconsiderable number of emphysema patients may, in fact, be unrecognized or incomplete cases of mucoviscidosis.

MESENTERIC VASCULAR
OCCLUSION IN INFANCY
AND CHILDHOOD

Although patients with mesenteric vascular occlusions are being encountered and operated upon more frequently, this disease is a rare entity in the pediatric age group in which the etiology is considerably different from that of the same disease in the adult. Although arteriosclerosis and thromboembolism are prominent in this disorder

(Continued on page 38)

"R Day"

for the neuritis patient
can be tomorrow

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Intramuscularly only, one ampul daily.

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Sherman Laboratories Ltd.

Windsor, Ontario

1. Lehrer, H. W., et al.: *Northwest Med.* 75:1249, 1955.

2. Smith, Richard T.: *New York Med.* 8:16, 1952



MEDICAL NEWS in brief

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in adults, they have little bearing on its occurrence in infancy and childhood. Ratner and Swenson (*New England J. Med.*, 263: 1122, 1960) recently reported on a study of 5 such cases from their own experience and 14 others from the literature. In childhood cases one-third of the occlusions were due to arterial thrombosis, one-third to venous thrombosis and one-third to combined arterial and venous thrombosis. One case has been described due to mesenteric arteritis and three to peritoneal bands compressing the vessels. In 15 cases the etiology was undiscovered despite the fact that all were subjected to either pathological examination of resected specimens or autopsy.

Symptoms and signs observed in order of frequency are as follows: vomiting, first gastric, then small bowel contents, 100%; abdominal distension, 100%; intermittent generalized abdominal pain, 90%; bright or dark red blood in feces, 30%; diarrhea, 20%; and constipation, 20%. On admission to hospital most of the patients had no fever but as the disease progressed the temperature rose in nearly all. Though peristaltic sounds could be heard in a number of these patients early in their illness, the abdomen soon became silent. An abdominal mass was palpable preoperatively or ante mortem in only one of the 19 patients. Moderate leukocytosis was common except in infants in the first month of life, whose leukocyte counts were normal or below normal for their age. Of the 19 patients reviewed, 17 were males and two were females.

Roentgenograms were of considerable aid in diagnosis. Gastrografen (diatrizoate methylglucamine) in a small bowel series enabled the radiologist to suspect the diagnosis in three of Ratner and Swenson's cases in which this technique was used. The contrast medium outlines a dilated, poorly functioning segment of the intestine with a thickened wall that is not mechanically obstructed.

The treatment of choice is early operation with resection of the gangrenous segment of intestine after preoperative restoration of blood volume. The mortality in nine patients not subjected to operation was 100%. Of the 10

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who were operated upon, seven had intestinal resections. Three were considered to be in a condition too poor to withstand resection, or the segment of non-viable intestine was too long to permit survival after resection and in these cases exploratory operation only was carried out. Among those subjected to operation the survival rate was 30%. The chances of survival without operation, on the basis of case reports in the literature, are nil. With operation there was a 30 to 40% chance of survival, a figure which could probably be improved with earlier diagnosis and operation.

THE SIGNIFICANCE OF VASCULAR INVASION IN LUNG CANCER

Surveys of carcinoma of the lung have traditionally emphasized the involvement of hilar lymph nodes and tumour cell type as the major factors determining prognosis. Mosely and Dickson (*Am. Rev. Respiratory Dis.*, 82: 807, 1960) considered that the rich vascular

bed of the lung would make the likelihood of vascular invasion by lung cancer of considerable importance in this regard and confirmed this impression by a study of surgically resected specimens, correlating the duration of survival with the occurrence of invasion of the pulmonary veins. In 25 surgically resected lung cancers, venous invasion was found in 22 (88%) and arterial invasion in 11 (44%). Lymph node metastasis was present in 12 (48%). The tumour cell types were: squamous cell carcinoma in 15 cases (60%), adenocarcinoma in 8 (32%), undifferentiated and cylindromatous carcinoma in one instance (4%) each.

In this series, if invasion of blood vessels was demonstrable in the surgical specimen, 72% of patients died within two years and 86% within three years. It seems logical to assume that some tumour cell masses lying within the pulmonary vein will not spread as tumour emboli via Batson's vertebral venous plexuses, vascular shunts or the pulmonary vein to become

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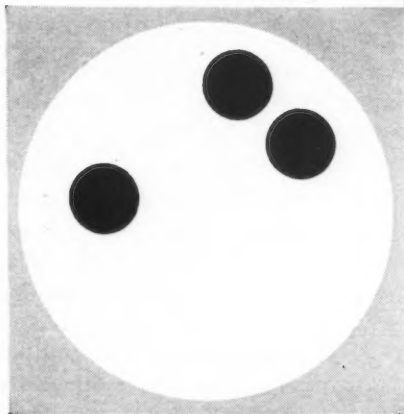
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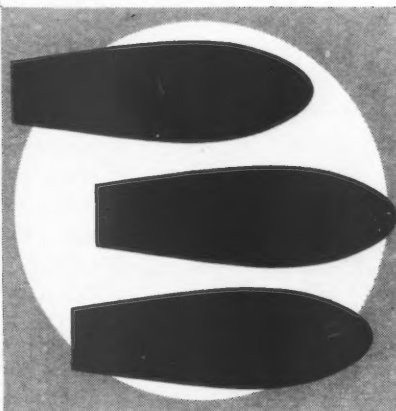


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MEDICAL NEWS in brief

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implanted as tumour metastases at distant sites. It is possible that biological predeterminism might govern whether such implants will grow as metastatic tumours. The resistance of the host is probably the factor which determines whether or not invasion of vascular spaces occurs. There is some correlation between the degree of malignancy and the incidence of blood vessel invasion. In this series

neither the size of the primary lesion nor its location had any discernible influence on the prognosis. It was recommended that any manipulation of the lung during resection for pulmonary carcinoma should be kept at a minimum and the pulmonary vein should be ligated as an early step in the resection procedure as an important measure in preventing tumour embolization.

If metastases are present in the hilar nodes, it is doubtful that their

radical removal would affect the survival of patients with lung cancer, as the majority of these persons die of widespread metastases due to vascular invasion.

On the basis of these observations it was concluded that invasion of the pulmonary vein by tumour cells is the important factor determining prognosis in lung cancer, the survival rate being higher if such invasion is absent. The presence of normal hilar lymph nodes, *per se*, does not necessarily imply a favourable prognosis.

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INTERFERON AIDS CELL RESISTANCE TO VIRUS

According to studies by Dr. Werner Henle, of the University of Pennsylvania School of Medicine, animals' cells in a tissue culture can coexist with viruses for as long as three years and still remain 99% uninfected. In a report to the autumn meeting of the National Academy of Sciences, in Philadelphia, Dr. Henle attributed the viability of the cells that escaped infection to the protein interferon that is produced by cells exposed to either living or dead virus particles and is capable of protecting susceptible cells against virus infection.

Experiments with cell cultures derived from mice showed a great majority of the cells apparently still healthy up to three years after infection with mumps, Newcastle disease, or parainfluenza viruses. Yet the viruses continued to multiply to some extent. "An induced resistance" appeared to result. "The noninfected cells in the cultures were not unaffected, in that they resisted superinfection with normally destructive viruses." The studies showed that "when about 1% of the cells had become infected, in three to four days, all the remaining cells had been rendered resistant to destructive superinfection."

It is believed that the interferon competes with the virus for susceptible cells. If the virus gains in concentration, more interferon is produced to reduce further spread of infection. Protection by interferon is transitory, and unless it is replenished constantly by the cells, the uninvolved cells become vulnerable. — *Medical Tribune*, November 28, 1960.